THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., MAY 21, 1891.

THE WEEK IN IRON CIRCLES.

General Features. The principal event of the iron market the past week has been the heavy purchases of charcoal irons by the malleable syndicate. It is estimated that these amount in the aggregate to 40,000 tons. Prices varied according to brands, but in some cases it is certain, low figures were made. While charcoal irons have been in oversupply for a time in consequence of slack business among the car works and railroads, the forces to correct this are already set in motion. In Alabama and Tennessee a large number of the furnaces are out of blast, and lately there has been a marked restriction of output in the Lake Superior district. The extensive forest fires also in the region from which many of the Lake Superior furnaces draw their charcoal, have destroyed a great deal of wood cut for this purpose. In time this will also affect the situation. In the way of general features bearing upon iron, the drouth, which is beginning to make itself felt throughout the West, causes a little uneasiness. No harm will be done if rain comes soon. In any event, the wheat crop is thought to be assured. Foreign financial troubles and continued shipments of gold have led to gradual hardening of money. Naturally we turn to the Detroit market for definite news concerning charcoal iron sales. That some heavy transactions have taken place is certain, but what the actual rock bottom figures are is still difficult to tell. Figuring upon a present cash basis, the terms of settlement having been so widely different, but it is credibly reported that figures are in advance of the lowest ones noted in the Chicago market for this grade of metal. The selling seems to be confined to two or three furnaces, which, on account of a large accumulation of metal, seem to have been forced into the market. They have, to a certain extent, set the pace in the Eastern market a little less than was reported a week ago, but at the same time favorite brands are bringing from 50 cents to $1.00 per ton more for special orders. Altogether probably between 20,000 and 30,000 tons were placed in Detroit during the last week of Lake Superior charcoal iron, which would make it the banner week, in the history of the trade this year. For coke iron, in the Detroit market, transactions have been small in volume at ruling figures. Southern furnaces are fighting shy at long deliveries, while Northern furnaces, except those situated in Central Ohio, are refusing orders until the coke question is settled and the reduction in railroad rates has been fully determined upon. Heavy sales of Lake Superior charcoal iron are also reported at Chicago. A large part of the season's buying in this line on the part of malleable car wheel and agricultural concerns has now been done, and in consequence of the large sales made most of the furnaces making metal of this class are now occupying a more independent position as to prices and long deliveries, and several companies have advanced prices 50 cents per ton. On coke irons there has been heavy buying, a large number of contracts having been placed for long deliveries, many of them running well into next year. The general feeling is gaining ground that the worst part of the market has been passed, and that more activity and better prices will prevail during the remaining portion of the year. At Louisville, the demand for iron continues fair on the part of buyers generally. A few purchases for large amounts have been made by those believing that the Summer and Fall would show much business, and that present prices were low enough to make heavy purchases. Some sales of Birmingham iron on basis of $10.25 for grey forge for long deliveries have been consummated, and one of the larger furnaces has placed 20,000 tons during the first ten days of the month, and are disposed to ask $10.50 for grey forge from now on. There have been some strong indications of increasing consumption at Buffalo in the past week. More inquiry is noticed than for several months past, but as yet this influence has not been sufficiently intense to advance prices. Shipments have included Northern and Southern brands, also Ohio silveries and Lake Superior charcoal iron. There has been considerably more inquiry for iron at St. Louis during the past week, than for some time. The car works in the vicinity have been making some purchases and are still inquiring for prices on round lots for deliveries running through the year.

The Local Situation. The reports of ore shipped from the Lake Superior country, short as the season has been thus far, indicate the reductions to be expected this year, both in the mining operations, and in the vessel business dependent thereon. A great many of the mines have materially reduced their working forces, some have shut down altogether, and the situation, from the producers' standpoint, could not well be worse. There are no sales of ore to report this week, but one firm is now negotiating for the sale of a large block of high-grade ore, for consumption outside the regular Cleveland market, at a sacrifice, the purchasers owning several furnaces which have been in operation all the time, and which are beginning to run out of their rich ores. Beyond this solitary instance, the ore men have nothing to report, and do not expect to report much in the way of sales for a long time to come. Everything considered, there are faint signs of an improvement in the furnace business—not an improvement in price, or an increase in consumption, but a return of confidence in the stability of the market. Some of the largest consumers, people who have studiously avoided contracts for months, and who in all this time of trouble have purchased their raw material from hand to mouth, and in car lots, seem to have realized the fact that iron is selling now for as little money as it is likely to sell, and are trying to hedge accordingly. That is, they have in several instances attempted to place respectable-sized orders at the ruling starvation rates, and these offers are an indication of the future. It is not unlikely that some furnaces, were they assured of their coke supply, would take advantage of these propositions in the hope of thus stimulating the market. The reserve stocks of iron in this vicinity have been so thoroughly cleaned up that there is immediate want of available pig metal for conversion into mill and foundry iron necessary for building operations already under way, and some of the furnacemen, knowing that the cutting off of any manufactured article carries with it a shrinkage in demand, hope to further stimulate the present demand for pig iron by resuming, when feasible, production, even though there be an actual loss in the first transactions, trusting to a subsequent improvent to "even up." It must be said, however, that this impression is by no means general in this market, and that there are a majority of producers who say that they will certainly remain out of blast until iron can be sold at a profit, no matter how long they have to wait for it. Manufactured iron, which a few weeks ago experienced a slump, is up again, bar iron selling at about $1.65. Sales were reported not long ago at $1.55 at the mill, so that the later price is a decided improvement. Sheet iron, which sold as low as $2.70 for No. 24, is also selling more firmly, and there is considerable demand for channels and other forms of combination iron for building purposes and structural work generally. The strike of the ore handlers continues, and there is little prospect of its early settlement. The dock companies, in self defense, cannot pay more here than is paid at adjacent and competing harbors for the same class of work, and, as the difference between employes and employers is about 30 per cent., it will be seen that the prospect of an agreement is very slim.

CONCERNING SOME CANAL PROJECTS.

The Iron Trade Review, while distinctly disavowing any interest in the Pittsburgh and Lake Erie Ship Canal scheme beyond the publication of such news concerning it as seems of public importance, can scarcely admire the attitude of its excellent contemporary, the *Marine Review*, toward the project. Instead of publishing the news concerning the enterprise, it contents itself with the assertion that it is "unfeasible," "a humbug," etc. It may be that the Legislature of Pennsylvania has lent itself to the encouragement of a gigantic swindle, and that such reputable gentlemen as Messrs. John A. Wood, of Pittsburgh, W. S. Shallenberger, of Rochester, Eben Brewer, of Erie, John M. Goodwin, of Sharpsville, and Thomas P. Roberts, of Pittsburgh, are aiding and abetting the great State of Pennsylvania in the perpetration of a John Law scheme upon the people, but we shall need further proof of this before dismissing the mattter with a mere epithet. On the contrary, it seems to be the part of wisdom, as well as of common honesty, to give to the manufacturers, shippers and vessel owners of the lake region all the information obtainable on the subject, without special comment, and allow them to judge whether the project is "unfeasible" or not. We have no disposition to instruct our sprightly contemporary in the way it should go, but simply state the position of this journal with reference to the enterprise. If, in entertaining a considerable degree of skepticism in regard to the ultimate success of the scheme, we fail to please the enthusiastic projectors of the cause, we cannot help that, nor does this fact interfere with the publication of such news as from time to time developes regarding it.

That our marine contemporary is not "ferninst" all canals is evident from the fact that it gives prominence to the proposed ship railway across the lower peninsula of Michigan. Upon this question it says: "On a ship railway the speed can never be less than 10 to 15 miles per hour. On the Suez Canal it is limited to 5 miles, and in the Welland to 4; but it scarcely ever attains to these on either." Pending the first trip of any large vessel by rail, we desire to remark concerning the Suez Canal, that the average time through that canal, in 1890, was 24 hours, 6 minutes; distance 100 miles. In 1890, 2,836 vessels (or 48 per cent. in number of those passing through the canal in that year) made a passage by night, using the electric light. In 1889, 71½ per cent. used the electric light, and made passage by night. The average time of passage by night, in 1890, was 22 hours, 9 minutes. The quickest trip on record was made by night: 14 hours, 15 minutes, or about 7 miles per hour.

Again, speaking of the plans of the Canadian Government for the Ste. Marie lock, it says: "Although Canada lacks the wealth necessary to carry on big improvements," etc. The fact is, that Canada has spent on the improvement of the St. Lawrence river, and in building the Welland canal, about three times the amount of money heretofore spent by the United States Government in lake improvements, altogether. Since 1844 the Canadians have expended on deepening the channel of the St. Lawrence between Quebec and Montreal as much as the United States Government has ever spent on the improvements of the Ohio river. The available depth of the St. Lawrence between Quebec and Montreal, as long ago as 1888, was 27 feet. In 1889 steamships, 522 in number, aggregating 763,783 tons measurement, entered the port of Montreal. The aggregate ocean and inland tonnage of Montreal in 1889 was 1,892,225 tons. Moreover, all of the locks of the St. Lawrence river system are in process of enlargement, although now they are big enough to pass gunboats of a class of which there are fifty examples in the British navy.

Canada evidently, does not appear to fear the expenditure of vast sums upon its internal waterways, nor does it consider such money thrown away.

THE FUTURE OF SOUTHERN IRON COMPETITION.

It is scarcely to be supposed that the Chattanooga *Tradesman* (quoted elsewhere) thinks it is doing the fair thing to discuss the labor situation, North and South, in the light of the present coke troubles in Pennsylvania. The Poles and Huns of that region no more represent the labor of the North than the convicts in the Southern mines represent the labor interests of the South. This country has seen enough of enforced immigration, and no man in his senses desires the perpetuation of the iniquitious system unwisely introduced by the coke companies of Pennsylvania. It is between the native American labor of the North and South that comparisons should be instituted, and it is to the natural readjustment of wages, North and South, that much of the coming equalization of costs will, we believe, be due. Much is to be said of the "docility" of negro labor, and much might be said of the probable results growing out of the gradual advance of this same "docile" laborer in the social scale, rendering him discontented with his primitive environments. It is not altogether improbable as in West Virginia that the "overflow help" from Pennsylvania, New York and Ohio may not only carry with them the "strike trick" learned in their "old haunts," but may impart the same to their "brothers in black." Let not, therefore, the *Tradesman* delude itself into the belief that its present "docile" labor will always remain docile. Such Acadian simplicity cannot last always. Changes must come that will affect cost in more ways than one, and bring the South up to the higher scale of wages paid in the North, and even the former's splendid advantages as to the proximity of raw material cannot avert it.

There must be changes in the North, also. It is possible that wages may have to come down; it is more than probable that freights will. The whole tendency will be to equalize the present discrepancy between the conditions of the two sections, our Chattanooga contemporary's comforting self-assurances to the contrary nothwithstanding.

Another factor in the problem is that referred to by an editorial communication in the same issue of the *Tradesman* from which we take the article in question. The communication is dated at Pittsburgh, and presents the results of recent observations in the Mahoning and Shenango valleys. Referring to the question of comparative costs, the editorial writer says:

It is, therefore, very reasonable to suppose in the light of these facts contrasted one with the other, the cost of producing pig iron in the South is at its lowest point, while in the North the cost is very high, and, therefore, capable of withstanding considerable reduction without inflicting material injury to the margin of profits or the industry itself, and further, it is most likely that the industries hinging upon the manufacture of pig iron in the North will grant large concessions rather than lose their business. The assertion is upheld by facts that mill iron can be produced in the North as low as $11 per ton, and still leave a fair margin of profit to all interests concerned.

After showing the fallacy held by many pig iron makers in the South that "the vast quantity and close proximity of the raw materials is all that is necessary to make them great as iron and steel producers," the writer goes on to say:

It is a known fact that several of the most prominent of Southern pig iron producing companies pay interest charges annually that would be considered a fair profit in the North, and not only does this item of interest add largely to the cost of making iron, but the outstanding notes, and interest expected due, make it imperative that the product of the furnace be converted into ready cash, and this condition of affairs creates an anxiety to sell, which has the result of making a weak market. There seems to be no end of the evil effects following in the wake of such loose business methods. The iron industry in the South has been created almost during the past decade. It has been built up with phenomenal rapidity, and very much unlike the methods that characterized the slow progress of the industry in the North, which was extended with the legitimate demands of the trade. During the past few months several instances have arisen showing Southern blast furnaces collapsing under the pressure of borrowed money, the depressed condition of trade rendering it impossible to meet interest charges and lift outstanding notes. As a contrary condition of affairs in the North, witness the firm stand the now four months' idle furnaces in the Mahoning and Shenango valleys have taken. During this siege of inactivity, not a single company is inconvenienced. They have no bonded capital, very insignificant charges, and working capital sufficient to meet any ordinary demands. Thus, Northern ironmasters are able to keep their business closely in hand, and accommodate themselves to the changing conditions of trade.

It is well to put the opinions of the traveling editor of the *Tradesman* against the office editor, and we do so without further comment, believing that the paragraphs quoted carry their own conclusions.

UNIFORM BOILER INSPECTION LAWS.

The most important action taken by the American Boiler Manufacturers' Association of the United States and Canada, at its recent meeting in St. Louis, was the adoption of a form of bill to be introduced in the various State legislatures, looking to State inspection of steam boilers. As this question is of the utmost importance to manufacturers and steam-users generally, we present the three leading sections of the proposed law, as follows:

SECTION 1. That for all purposes of manufacture, sale, use and inspection of steam boilers within this State, the following designations shall be applied and observed, that is to say: All boilers properly constructed and braced, made of A. B. M. A. brand, shall be classed as No. 1. All boilers properly constructed and braced, made of the best flange iron or best flange steel, shall be classed as No. 2. All boilers properly constructed and braced, made of shell iron, or shell steel, shall be classed as No. 3. All boilers properly constructed and braced, made of cast or tank iron, or tank steel, shall be classed as No. 4; and every boiler manufactured or sold after taking effect of this act, shall be visibly stamped on its outside sheets or surface, designating the kind and quality of material used in its construction. Whenever a contest shall arise, as to what constitutes a No. 1 boiler, as to the material, the standard adopted by the United States Marine Law shall govern.

SEC. 2. That any person who shall manufacture or sell any boiler not stamped according to the provisions of Sec. 1 of this act, or who shall manufacture or sell any boiler belonging to any of the classes specified in Sec. 1 of

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES

May 1, 1891.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	In Blast. No.	In Blast. Week'y capacity.	Out of Bl'st. No.	Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	In Blast. No.	In Blast. Week'y capacity.	Out of Bl'st. No.	Out of Bl'st. Week'y capacity.
New England	13	6	546	7	591	.....	.....	.....	.....	.....
New York	9	0	0	9	1,111	6	4	3,789	2	1,601
Pennsylvania	14	3	281	11	841	1	0	0	1	600
Upper Susquehanna Valley	.....	.....	.....	.....	.....	25	12	17,597	13	14,980
Pittsburgh	.....	.....	.....	.....	.....	1	0	0	1	830
Spiegel	.....	.....	.....	.....	.....	1	0	0	1	930
Allegheny Valley	.....	.....	.....	.....	.....	17	3	2,988	14	10,252
Shenango Valley	.....	.....	.....	.....	.....	4	0	0	4	2,838
Youghiogheny Valley	.....	.....	.....	.....	.....	19	7	3,140	12	6,074
Juniata and Conemaugh Valleys	.....	.....	.....	.....	.....	3	1	1,411	2	1,487
Maryland	7	1	110	6	555	14	9	4,972	5	2,232
Virginia	11	2	86	9	578	1	1	100	0	0
North Carolina	.....	.....	.....	.....	.....	6	0	0	6	3,606
West Virginia	2	0	0	2	130	15	4	3,466	11	9,370
Ohio—Mahoning Valley	.....	.....	.....	.....	.....	17	9	6,121	8	6,573
Eastern, Central and Northern	.....	.....	.....	.....	.....	14	3	1,206	11	2,968
Hocking Valley	.....	.....	.....	.....	.....	14	10	2,161	4	740
Hanging Rock	12	0	0	12	1,137	.....	.....	.....	.....	.....
Miscellaneous	.....	.....	.....	.....	.....	5	2	573	3	976
Kentucky	1	0	0	1	98	.....	.....	.....	.....	.....
Hanging Rock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Western Region and Miscellan'ous.	.....	.....	.....	.....	.....	13	9	4,627	4	1,538
Tennessee	6	3	879	3	462	2	1	743	1	675
Georgia	3	0	0	3	379	38	21	14,264	17	11,001
Alabama	14	5	1,262	9	1,930	2	1	122	1	278
Indiana	.....	.....	.....	.....	.....	14	2	2,601	12	11,858
Illinois	.....	.....	.....	.....	.....	.....	...	.....	.....	.....
Spiegel	.....	.....	.....	.....	.....	4	0	0	4	2,875
Michigan	23	11	3,508	12	3,481	1	0	0	1	140
Wisconsin	5	3	1,419	2	550	5	0	0	5	3,764
Minnesota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri	2	1	312	1	315	2	1	461	1	350
Texas	3	2	535	1	306	.....	.....	.....	.....	.....
Oregon	1	1	280	0	0	.....	.....	.....	.....	.....
Colorado	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	1	0	0	1	205	.....	.....	.....	.....	.....
Total charcoal and coke	127	38	9 218	89	12,669	244	10	70,342	144	98,536
Total anthracite	161	93	37,026	68	22,087	.....	.....	.....	.....	.....

SUMMARY.

FUEL.	IN BLAST. Number. Month Previous.	Number. Year Previous.	Weekly Capacity.	Month Previous.	Weekly Capacity. Year Previous.	OUT OF BLAST. Number.	Number. Month Previous.	Weekly Capacity.	Month Previous.
Charcoal	38	42	53	9,218	10,055	11.474	89	87	12,669	12,522
Anthracite	93	92	122	37,026	37,093	48,853	68	70	22,087	22,622
Bituminous	100	97	166	70,342	66 168	120,529	144	146	98,536	102,069
Total	231	231	341	116,586	113.316	180,856	300	303	133,292	137,213

this act, shall stamp or in any other manner represent the same as belonging to any other of said classes shall be deemed guilty of a misdemeanor and on conviction thereof shall be fined not less than fifty ($50) dollars nor more than two hundred ($200) dollars, and by imprisonment not less than ten (10) days nor more than three (3) months.

SEC. 3. It is hereby made the duty of boiler inspectors appointed under the act approved ——— ——, in addition to their other duties, to prosecute all offenders for violation of the provisions of this act.

In adopting the above form of law the association also declared "that we as an association can and do recommend only such boilers as will pass under the proposed law as No. 1; but that as the very organization of our association proves that inferior boilers have been and are being built, we believe such classification is necessary in order to show the public that there are different grades of boilers built, and thus to make it possible for every intelligent steam-user to discriminate between good and poor work." It was also decided to ask for congressional action, somewhat on the lines of the inter-state railroad law. The association shows an intelligent appreciation of the present law methods of boiler inspection, and it is to be hoped that success may crown its efforts to bring about a much needed reform.

COST OF PRODUCTION NORTH AND SOUTH.

Here is something from an eminent New York journalist which we commend to the consideration of editors of Northern and Eastern organs of the iron and cognate trades:

"The Poles and Huns in the coke regions of Pennsylvania were prevailed upon to go on a strike—for the sake of the strike, apparently—and then they were stimulated to destroy property and assail with stones and pistol shots those on guard to protect it. They lived in houses, the property of their employers, and when they ceased to work and became destroyers their houses were wanted for those that would work. Blood was shed, and those who began with violence were responsible for it. There was an awful clamor because the representatives of law and order fired in return and the red flag appeared. The strike was a self-evident failure from the first. The spirit of destructiveness proclaimed that. One wonders at the way strikes are ordered and carried on under the very circumstances that make them hopeless. At times there is reason to think they are organized by those who would discredit the cause of labor. The Chicago *Tribune* gives a summary of the result of the coal strike thus far:

"'They have entailed a loss of more than $2,000,000 upon the railroads in freight revenues; they have crippled factories in Pittsburgh and elsewhere, thus involving other workingmen in serious losses; they have destroyed property in the most wanton manner, lost several weeks' wages themselves, been evicted from their homes, and some of them have been shot.'"

If the editor of the Cleveland (O.) *Iron Trade Review* and others who have imagined of late that they had found the key to the cheap production of iron in the South in cheap Southern labor, will ponder these facts and put them with the great mass of facts of like import, they will master, possibly, one of the chief reasons why the South can and does make iron at low cost.

In the quarter century history of the Southern iron trade there has never been but one serious coal strike, and not one of a general character in the mills and furnace yards of this section. Southern labor, as a rule, puts in a full year of work. Wage disputes are generally settled without resort to strikes. Hence the men have a great advantage in more steady work, as well as a milder climate that enables them to live more cheaply than can their brethren of the North. The family of a Northern mechanic must consume enough more coal in the year to pay a good share of the Southern mechanics' rent or other bills. Large numbers of the workers about Southern furnaces and mines live in their own houses in the surrounding country districts, and they there find time to do some farming on their own ground. They work their teams hauling ore, fuel, etc., for the furnaces and mills when they are not needed in the fields. They raise often a small surplus, and the furnace provides for this a good, ready cash market. Being proprietors as well as laborers, they have an interest in maintaining law and order in the neighborhood, and sense enough to know that a strike will hurt them worse than the company which gives them employment. This conservative element among whites and blacks, coupled with the docile disposition of the negro in general, have made strikes in Southern industries of all kinds rare indeed. Our labor is drawn from the vicinage, not from the dens and slums of Italy and Hungary. Southern labor has a stake in the country; the men are citizens and voters, and such men are inevitably easier to deal with than foreign riff-raff who come to the country to "make a stake" and carry it back to their old homes.

Look at the facts of the existing strikes in this month of May, as set forth in an editorial in these pages, learn the lesson they teach. Of the 25,000 miners out on strike not one is in a strictly Southern State; those in West Virginia are a petty fraction of the total, and they are of the foreign class. Besides, the iron and correlated trades in West Virginia are not of the South, and ought not to be classed as Southern. They are mere overflow from Pennsylvania, New York and Ohio Their "help" learned the strike trick in their old haunts.

We may admit for the sake of argument that the South has the advantage as an iron manufacturer in slightly cheaper labor than the North, but we deny that Northern miners can and do earn more year by year than do Southern miners, and the same is true of Southern furnace and mill hands. If a man may in one locality live 20 per cent. cheaper and put in 10 to 20 per cent. more time at his work than he can in another locality, he can and will accept slightly lower wages in the first named. These things adjust themselves.

Then there is the question of freights. Northern mill operators, furnacemen and mill men perpetually complain that they must pay exorbitant rates of transport, as compared to rates in the South; and one reason for this is furnished in the foregoing quotation from the Chicago *Tribune*. A single strike deprives the roads leading out from the Connellsville coal and coke region of $2,000,000 and more in their finances in less than a quarter of a year. The resulting losses beside those of the work itself, are enormous. Millions of dollars worth of rolling stock is thrown idle while the strike is on. Armies of railroad employes are "laid off" from month to month, while other armies of semi-barbarous foreigners engage in a fruitless contest with the mining and furnace companies, and these latter destroy or cripple by fire and other violent means, great plants that cost others millions. These losses must be made good somehow, and labor comes in for its share when the time for recouping arrives.

In some Southern industries, notably in the cottonseed oil trade, the South pays somewhat higher wages than any Northern trade employing like grades of labor. The oil mills are practically all manned by negroes, except a manager and two or three foremen. Nobody has yet heard of a strike in a cotton oil mill. They invariably pay cash, and wages run from $1 75 for common to $3 for skilled hands. In the Southern spinning trade there has never been but one strike of consequence, and that lasted only a few weeks.

These conditions would be impossible if Southern labor was so poorly paid as some of the Northern class journals assert it is. The fact that our furnaces make excellent iron, that our cotton mills produce the best goods of the grades they turn out in the world, that our mills and other factory plants are intelligently and successfully handled, demonstrates that the labor is not of the lumpish, stolid, stupid sort that could be successfully robbed, virtually enslaved, as our Northern contemporaries assert they are.

Of course our cheaper raw material and lower rates of freights must be taken into the account. The average labor cost in the pig iron trade in Alabama is about 90 per cent. of the whole, but 10 per cent. being chargeable to material and all other accounts. In Tennessee the labor cost is a trifle less, and the cost of material a little greater. The cotton mills have like advantage over those of New England, Pennsylvania and New Jersey. The cost of material in the North is fully half the cost per ton of iron. The Eastern cotton mills pay large freight and insurance bills on their raw material and receive it in condition that makes its manipulation more costly. The cases are similar to those of the farmer who lives chiefly off the fruits of his fields, and the town dweller who buys everything he consumes, paying freights and two or three profits to middlemen. The South has her furnace within easy distance of all raw material, her cotton mills are in the midst of her cotton fields. Her vast water powers never freeze. Her climate is so mild that the whole 313 working days of the year can be utilized.—[Chattanooga Tradesman.

A NEW GAS ENGINE.

At the present time our attention is attracted by any device that promises to reduce the cost of producing power, or, to state it with greater accuracy, utilizes a larger percentage of the energy stored in coal. At the present time the gas engine leads, developing an indicated horse-power from less than 1½ pounds of coal, results of one test showing 1.11 pounds per indicated horse-power per hour and that, too, in a 12 horse engine developing but 7 or 8 horse-power. If such results as these can be obtained in every-day practice the gas engine is the coming motor. In this country its development has not progressed so rapidly as in Europe, and we are but beginning to realize that it is a more economical motor than the steam engine and will, eventually, supersede it. It has been, and still is, generally regarded as a motor suitable only for small powers, but that the contrary is the case and that large, powerful gas engines can be built the mechanical world is just beginning to see. This being the case, those engaged or interested in the production of power should familiarize themselves with the history of the gas engine, with the principles controlling its operation and with the mechanical devices adopted to the various engines that have, from time to time, been placed on the market; they would then be in position to judge intelligently of the relative merits of the surviving engines.

It is not our intention to give the history of the gas engine, but merely to call attention to the conditions necessary to obtain the greatest economy. Clerk, in his work, "The Gas Engine," refers to a pamphlet published by Beau de Roches, in Paris, in 1862, and we quote: "He states that to obtain economy with an explosion engine, four conditions are requisite:

"1. The greatest possible cylinder volume with the least possible cooling surface.

"2. The greatest possible rapidity of expansion.

"3. The greatest possible expansion.

"4. The greatest possible pressure at the commencement of the expansion.

"In using boiler tubes, he states, the efficiency of the heat transmitted increases with the reduction in the diameter of the tubes. In the case of engine cylinders, therefore, the loss of heat of explosion would be in inverse ratio to the diameter of the cylinders. Therefore, he reasons, an arrangement which for a given consumption of gas, gives cylinders of the greatest diameters will give the best economy, or least loss of heat to the cylinder. One cylinder only must be employed in such an engine. But loss of heat depends also upon time; cooling, therefore, will be proportionately greater as the working speed is slower. The sole arrangement capable of combining these conditions, he states, consists in using the largest possible cylinder, and reducing the resistance of the gases to a minimum. This leads, he states, to the following series of operations:

"1. Suction during an entire out stroke of the piston.

"2. Compression during the following in stroke.

"3 Ignition at the dead point and expansion during third stroke.

"4 Forcing out of the burned gases from the cylinder on the fourth and last return stroke.

"The ignition he proposes to accomplish by the increase of temperature due to compression. This he expects to do by compressing to one-fourth of the original volume."

The only successful engines that have been placed on the market are those embodying the above cycle. All others have had but a short life and have disappeared; some of these have been resurrected under different names, only to repeat the same history.

In designing an engine to meet the conditions laid down above, the first may be provided for by careful designing, and the second by high piston speed; this being limited by the time necessary for complete combustion. But the difficulty begins with the third, as the greatest possible expansion can only be obtained by expanding the charge to a volume greater than the original volume; for when expanded to the original volume only, the charge will have a high terminal pressure, and if expansion is is only carried to this point the products of combustion will be discharged with a large amount of energy not utilized. The difficulty also continues with the fourth, as the purer the mixture the higher will be the pressure at the commencement of the expansion, and in an engine in which the four strokes are of equal length it is impossible to obtain a pure mixture, owing to the fact that the necessary compression space is after the exhaust stroke, left full of the products of combustion, and these, of course, adulterate the charge and reduce the pressure. There is also another disadvantage attending the use of such a compression space, and that is, that it places a limit upon the size of the engine; for if an engine of large power is built, the cooling surface of the cylinder will bear such a small ratio to the volume of the cylinder that the percentage of heat lost to the surfaces by the products of combustion during the exhaust, suction and compression strokes will be very small, and the temperature of the charge will be so high that when the heat due to compression is added, a premature explosion will take place, and the motion of the engine be retarded or reversed. Consequently, to increase the power of engines after certain power has been reached one or more cylinders have been added, forming, in reality, separate and distinct engines connected to one crank shaft.

A new engine has, however, appeared, which not only overcomes the difficulties presented by the third and fourth conditions, but also the latter trouble; and, in order to emphasize the statement that it approaches more nearly than any other to the ideal engine, we would call attention to de Roches' cycle as followed in engines of the Otto type. During the suction stroke the charge is drawn in and mixes with the products of combustion. The next stroke compresses it, ignition then takes place, and it is expanded to the original volume only, and the terminal pressure is high. The products of combustion are then expelled by the fourth stroke.

The new engine referred to—Atkinson's cycle gas engine—performs all these operations in one revolution of the crank shaft. Fig. 1 is a perspective view of the engine, and Fig. 2 a sectional elevation showing only the mechanism by which the above operations are effected. It will be noticed that the different operations are obtained by the addition of but two parts—a link which vibrates through the arc of a circle, and a connecting rod—and by changing the position of the crank shaft in relation to the cylinder. The outer end of the piston connecting rod is attached to a pin passing through the crank connecting rod, and the latter is connected to the link; the different centers are so placed in relation to each other, and to the center line of the cylinder, that the center of the pin to which the piston connecting rod is attached travels in a curve resembling the figure 8, passing over the portion S E during the suction stroke, over C. W. during the compression stroke, over W. E. during the working stroke and over E. S. during the exhaust stroke. The figure shows that the compression stroke is shorter than the suction stroke, that the working stroke is almost double the suction stroke, that the exhaust stroke ends with the piston as close to the cylinder cover as it is possible mechanically to have it, and that the working stroke takes place in one-quarter of a revolution. It is apparent that, with a given rotative speed, greater rapidity of expansion can be obtained with this engine than with engines of the Otto type, and that it is possible to expand the charge to such a volume that the terminal pressure will be reduced to the lowest practical point, and that, owing to the purity of the charge, the greatest possible pressure will be attained at the commencement of the expansion. Further, that owing to the fact that practically all the products of combustion are expelled, the incoming charge will attain no higher temperature in a large engine than in a small one, and, consequently, large sizes can be built.

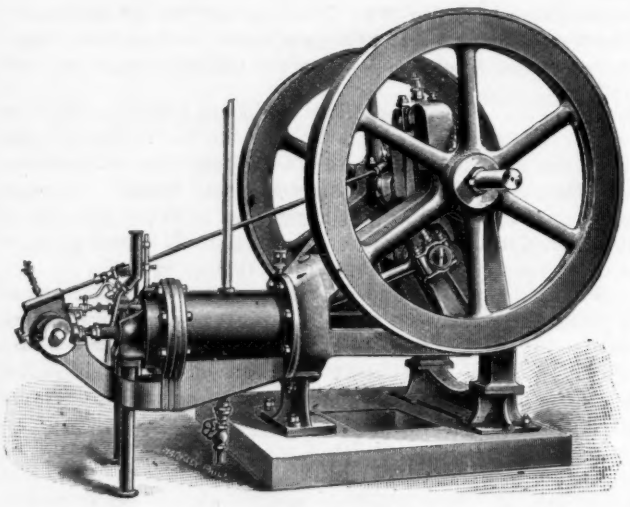


FIG. 1.—PERSPECTIVE VIEW.

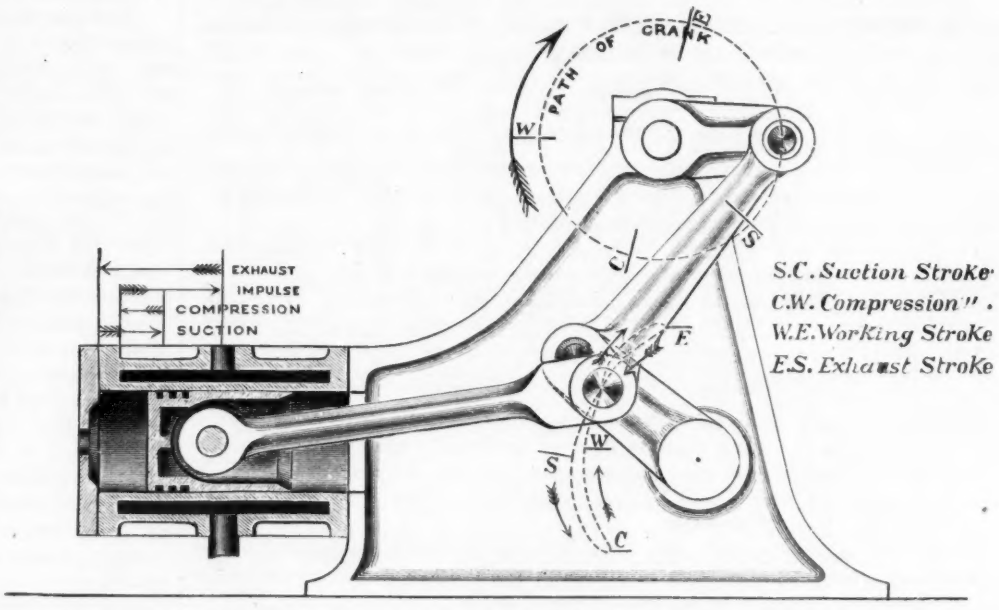


FIG. 2.—SECTIONAL VIEW.

A NEW GAS ENGINE.

This, certainly, is a remarkable piece of mechanism to accomplish such results by such simple means, and the results of tests made by disinterested parties show that the friction cannot be any greater than in an ordinary engine. If this engine should prove a commercial success opeated in conjunction with a producer for making cheap fuel gas, there can be no question as to its superseding all other prime motors, and we understand it has proven successful in England, and is now being manufactured in this country. This engine is manufactured by Henry Warden, Germantown Junction, Philadelphia, Pa.

TWO new steamers, each of 14,000 tons, are being built on the Clyde for the Cunard line. This is nearly 4,000 more than the City of Paris. Slowly, but some think surely, we are approaching the 60,000 horse-power steamer that the English designer, Barnaby, has described.

THE MANUFACTURE OF CAST STEEL.*

BY M. LOUIS CAMPREDON.

Formerly the word recarburation was employed to describe the process shortly before tapping for giving to the cast metal the desired properties. It is scarcely necessary to say that in most cases this expression was inaccurate, for there were added at the same time as the carbon, other elements which became incorporated in the metallic bath. It is therefore more accurate to designate by the words final additions the last phase of the metallurgical operation with which we are occupied. It consists in introducing into the bath, arrived at the wished-for degree of softness and purity, as shown by testing, a certain proportion of special manganesiferous iron. The question for the operator is to give more or less body to the metal so that it may respond to the requirements expected of it. In reality the final addition causes an entire metamorphosis, and of a metal that is oxidated, full of holes, and useless, it makes an extra-soft or cast steel.

Utility of the Final Additions.—It is allowable to enquire if it would not be possible to do without the final addition which always occasions a loss of time, a consumption of valuable reagents, and in consequence an increase of the cost of manufacture. Why should not the work be so conducted as to avoid these too great oxidations, and thus retain in the metal the constituent elements of cast steel? This method of procedure is applicable when the furnace is supplied with pure material, but it is not all realizable under the conditions that we have mentioned when it is necessary to treat very impure pig and scrap.

Nature of the Final Additions.—The operator, guided in this by an examination of the samples and quality of the metal to be produced, will prescribe the use of the various reagents as follows: Hematite pig, that is, very pure grey pig; spiegel, or manganesiferous pig containing from 10 to 25 per cent. of manganese; ferro-manganese, with 75 to 80 per cent. of manganese and 6 per cent. of carbon combined; ferro silicium, silico-spiegel, special chrome pig, tungsten, etc. It is rare that the final additions are charged in the furnace cold; most frequently they are brought to red heat in a placed in proximity to the Martin-Siemens furnace; sometimes also the reagents are melted before being charged. This latter method of procedure is habitually followed in work with the converter. The heated pig becomes incoporated more easily and regularly in the metallic bath which is to be disoxidized and recarburated.

Quantity of the Additions—The weight of the reagents added varies essentially with the state of the bath of metal, the speed of the furnace, and the properties of the metal to be obtained. The operator, relying on the observations of long experience, can alone determine with sufficient nearness, the necessary quantity of final additions. In all cases it is necessary to watch that the distribution of the reagents is as equal as possible, so that the work in the bath may be general and regular. During and after the additions, it is desirable to maintain in the furnace a reducing gaseous atmosphere, or as little oxidizing as possible. With this object the admission of air is restricted. It is found to be a good plan to throw in at the top some shovelfuls of powdered lime on the surface of the bath. This practice, however, presents an inconvenience. The limedust is carried by the gaseous currents into the recuperating chambers, and causes sensible deterioration.

Role of the Various Elements added.—In the ordinary working of the Martin-Siemens furnace, with the object of producing cast steel, three principal reagents are made use of—spiegel, ferro-manganese and ferro-silicium, which act by their carbon, silicium and manganese. The carbon of the reagents acts on the oxides of iron and reduces them to a metallic state, assuming itself the gaseous form of oxide of carbon. At the surface of the bath, agitated by their liberation, the oxide of carbon is seen burning with a blue flame. The silicium also acts on the oxides of iron. It sets the iron at liberty by producing silica which is incorporated with the slag. The manganese is the reducing agent *par excellence*; moreover, it exists in the pig for final additions in dominating proportion. It seizes upon the oxygen of the oxides of iron, and passes into the form of protoxide of manganese, which is found in the slag.

Waste and Recarburation.—The oxides of iron which are formed in the course of working are found in the bath in two different conditions—(1) associated with the metal, which they render brittle, that is to say, hot short; (2) incorporated with the slag, of which they form an integral part and to which they communicate a more or less deep grey or brown tint.

The reducing elements contained by the additional pig act on both of these oxides. They completely reduce the oxides associated with the metal, so that it acquires the properties of well deoxidized steel. They also reduce a part of the oxides of iron of the slag. The recuperation of iron thus realized is not to be neglected; it is much more important when the addition of reagents is more considerable. It is possible, therefore, up to a certain point to diminish the loss of iron or metallic waste by forcing the final additions. The operator is, however, very quickly stopped on this seductive course by the price of the final additions.

Rephosphorization.—The liberation of oxide of carbon which we have already noticed, and which is always manifested when the final additions are made, acts on the slag, from which the phosphoric acid is decomposed. The oxygen unites with the oxide of carbon, which is thus converted into carbonic acid, while the phosphorus set at liberty is incorporated with the metal. In a few minutes the operator risks losing the fruit of his labor by compromising the success of the dephosporization. To avoid the difficulties which result from this rephosphorization *in extremis*, several methods are employed with success, especially in the manufacture of cast steel. (1.) To evacuate the greater part of the phosphatic slag, the basicity of which is augmented by the addition of lime. It is admitted that in slag rich in lime the phosphoric acid resists more successfully the reducing action of the oxide of carbon. (2.) To run off the metal and to recarburate it apart from the slag.

Conclusions.—The final additions has the effect of reducing the oxides dissolved in the bath or allied to the slag; and as a corollary to reintegrate in the bath a notable part of the iron useless in the form of oxide dissolved or allied to the slag, and in this way to diminish the waste of metal. This latter result is mainly due to the manganese. The quantity of the final addition will be greater in proportion as the oxidization of the bath and slag has advanced. There is therefore a considerable economical interest, as we have pointed out in a work published in collaboration with M. E. de Gaechter, to avoid as much as possible, in the conduct of the operation, the super-oxidization of the bath; in the calculation of the fusion bed, a too great proportion of slag, which must be charged with oxides to realize its refining and purifying action. In the typical charge which we follow, the final addition was made of 150 kilos. of ferro-manganese with 70 per cent. of manganese. The metal obtained gave the following analysis: Carbon, 0.150; silicium, 0.030; manganese, 0 400; phosphorus, 0.040; sulphur, 0.050—a composition which corresponds to that of a cast steel of ordinary quality.

*Translated specially for the *Colliery Guardian* from *La Metallurgie*.

The Iron and Steel Industries of America.

Under the above title, Sir James Kitson, Bart., contributes to the current number of the *Contemporary Review* (London) an article descriptive of the visit of the Iron and Steel Institute to America, last Autumn. After indicating the special features of the iron and steel industry on the other side of the Atlantic, the writer expresses the opinion that the leading characteristics of those engaged in the work are their quickness to adopt improvements, and their readiness to adopt scientific methods in the processes of manufacture. He says: "Great as has been the industrial growth of America, marvelous as are the mechanical achievements of Americans, we can still claim that the inventions which have brought the manufacture of iron and steel to its present state of perfection, are of English origin. The Americans have not invented, they have improved. They had not time to experiment, they have appropriated. They possess a surprising gift of receptivity and a peculiar faculty for adaptation. When the great development in American manufacture took place, Americans engaged in the iron and steel trade had the best practice, and the best methods of Europe before them. They were never handicapped by preliminary experiment. Special commissioners on behalf of the leading American ironmasters examined the Bessemer process after it had been established in England. After inquiry they profited by English experience. Thus many mistakes were avoided and much time saved. With this knowledge, supplemented by their own ingenuity for mechanical devices and appliances, they were able to lay down plants of the best models, and of great strength and capacity, so that their Bessemer plant compares favorably with any to be found in Europe. Their blast furnaces are more capacious than ours, their engines are more powerful, their rolling mills are of new and improved construction. The high standard of education, and especially of the technical education, of the people in America undoubtedly is much to their advantage, and we everywhere recognized a promptness to discard old methods and plant, and an alertness to adapt the newest and most scientific methods of production."

Suez Canal Statistics.

According to the official report, 3,389 vessels passed through the Suez Canal in 1890; this is 36 fewer than in 1889, but the total tonnage for 1890 was 6,890,014, or 106,676 tons in excess of 1889. The number of British vessels using the canal last year was 2,522, or nearly 75 per cent. of the whole number. Next to Great Britain comes Germany, with 275 vessels; France had 171, and Holland 144. Progress has also been made in the time of transit through the canal, the average time being 24 hours 6 minutes, or 1 hour 44 minutes less than in 1889. The use of the electric light has increased the facilities for vessels passing through the canal, the journey by night being accomplished on the average in 22 hours 9 minutes, which is 21 minutes less than the average for 1889. It is now four years since the electric light was used, and the progress has been very great. In 1887, only 395 vessels employed the light, while last year 2,836 vessels used it. Most of the vessels obtain the apparatus from agents at Suez or Port Said, the light being supplied at a uniform rate of £10 to the transit.

Soaps Used for Cleaning Metal Work.

The soaps used for cleaning metal work usually consist of mixtures of vaseline, oleic acid and fat, mixed with a small quantity of rouge. When freshly prepared they leave nothing to be desired; but unfortunately, such mixtures soon turn rancid and become unfit for use. A new soap for metal work, which is stated to be free from this objection, is made from cocoanut butter in the following way: 25 kilos. of the butter are melted in an iron vessel, together with a little water, and to the mixture is added, with constant stirring, 180 grms. of chalk, 87.5 grms. of alum, 87.5 grm. of cream of tartar, and 87.5 grms. of white lead. This mixture is then poured into moulds and allowed to solidify. The *Chemical Trades Journal* says the soap so obtained is made into a paste with water and rubbed over the metal to be cleaned, and finally removed by a dry rag or chamois leather.

A Powerful Search Light.

A search light for railway purposes was tested recently by the electrician of the Jersey Central Railroad. One Huntington light of 3,200 candle-power was mounted on the switch signal bridge, 20 feet above the track. It is said that when turned on a station building one-third of a mile away even the outline of the bricks could be distinctly seen; when turned on the track the ties could be seen in front of the same station. Colors were plainly distinguished at a half-mile distance. At 1,500 feet it would enable an engineer to tell the position of switches. The reflector was parabolic like those of locomotive headlights, and were silver-plated and highly burnished.

EXPLOSION OF A DOUBLE-DECKED BOILER.

Our illustrations this month show an explosion that occured some time ago, in a mill in Pennsylvania. The general situation of the boiler-house, mill and other buildings will be seen in Fig. 2. The main building is about 165 feet long, and four stories high, the end of it being toward the street. On the street end was an L, about 18 feet square, containing a stairway; and in the

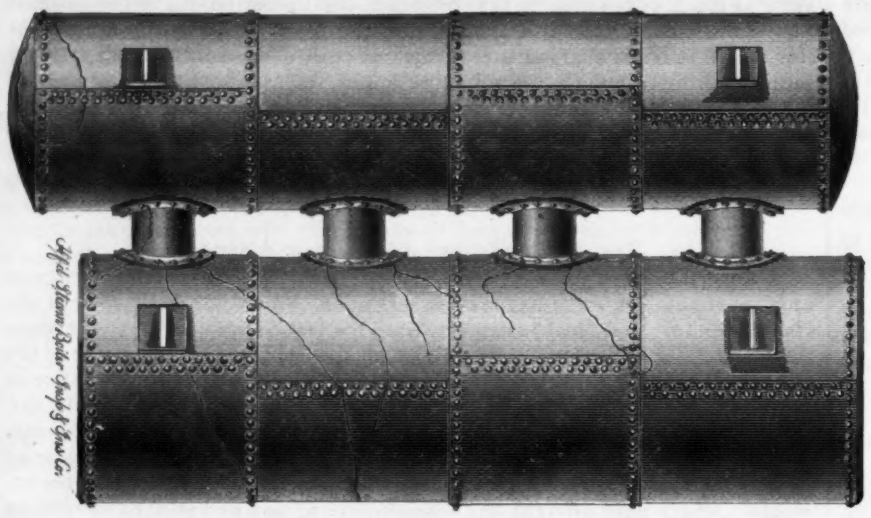


FIG. 1.—ELEVATION OF EXPLODED BOILER.

corner between this L and the mill was the office, which was about 16 feet wide and 20 feet long, the entrance to it being on the second floor of the mill. The office is shown dotted in Fig. 2, as it did not extend down to the ground, but was supported by a column under its outer corner.

As will be seen from the cut, the boiler-house stood with one end against the mill, and about 35 feet from the rear end of it. The stack was built in the wall of the mill, between it and the boiler-house.

The general design of the boiler will be seen in Fig. 1, which also shows the manner in which the fractures ran, as nearly as we could judge from the fragments, which were scattered about the vicinity by the explosion. The dimensions of the boiler may be gathered from the following description of it: It was constructed of four sheets or rings, the top drum having the same number of rings, and being connected with the lower part by four necks, each 15 inches in diameter, one to each sheet. The lower, or tubular, shell was 16 feet long and 60 inches in diameter, containing 52 tubes, each 4½ inches in diameter and 16 feet long. Under these was a manhole, 11 inches by 14 inches. The drum or upper part was 17 feet long, and 48 inches in diameter, with a manhole 11 inches by 14 inches through the second sheet from the front end.

The thickness of the plates varied from 0.36-inch to 0.39-inch—evidently intended to be ⅜-inch. The rivets used were ¾-inch in diameter, the longitudinal joints being double riveted, and the girth joints single riveted. The pitch of rivets in the drum was 2⅛ inch. In the lower or tubular portion, the pitch was a little less than this, eleven rivets just making 23 inches in length. The plates were all stamped with the maker's name, and marked "C. H. No. 1. Flange. 50,000 lbs."

Where the sheets were pulled apart they showed little or no reduction of area, and the fracture was not what would be expected from good iron. Portions of it were afterwards tested and bent, both hot and cold. Some seven or eight tensile tests were made, with results varying from 35,000 lbs. to 54,000 lbs. to the square inch, and with an elongation not greater, in any case, that 4 per cent. Some of the pieces showed none whatever. It was found that the sheets would not bend to a radius of four feet without breaking, and some were so brittle that they would not bend at all. Heating the metal red hot seemed to make it worse, rather than better, in this respect. It may be added that the test pieces were taken from parts of the sheets, that were considered to be uninfluenced by the shock of the explosion.

The location of the principal fragments of the exploded boiler will be seen in Fig. 2. The upper shell, together with the necks attached to it, and the rear sheet of the lower shell, was blown some 200 feet lengthwise of the mill, crossing the street and striking against the second story of another mill, after which it fell back and lodged on the curb of the sidewalk. The rear head, with 14 tubes clinging to it, landed about 75 feet from the boiler-house, in a direction nearly at right angles to the course followed by the first fragment. Twelve tubes were found lying beside it. This head landed just as it was in the boiler. The sheet had torn off through the line of rivets around the flange, leaving the caulking edge of the sheet a perfect ring on the head outside of the rivets. The front head went clear of the tubes, and lodged against a bank wall about half as far away as the back head. The front sheet was hanging to it, torn off all but about a foot, and a portion of the second ring of plates clung to it likewise, well twisted up. Another ring and a half of plates went toward the right in the cut, landing about 70 feet away. These rings were badly torn up. None of the pieces showed signs of overheating.

It is not easy to say just how the explosion occurred. It took place at the noon hour, when the fire was banked, and the damper and ash-pit doors were closed, and the fire doors partly open. Ordinarily, 80 lbs. of steam were carried, but it is maintained that the pressure was only 70 lbs. at the time of the explosion. The sheets were so badly torn up that it was very difficult to decide where the initial rupture occurred. We did not insure this boiler, but, in the opinion of one of our inspectors, who visited the place shortly after the explosion, a fracture had started along one of the horizontal riveted joints some time previously. This is borne out by the engineer's testimony. He heard a hissing noise, as of escaping steam, on the Thursday or Friday before the accident happened. Thinking that a leak had started somewhere he looked about for it, but without success. Afterward he thought the noise stopped, but on Sunday he went into the rear end of the setting to see if the tubes were leaking, and found that they were not. The explosion occurred on the following Tuesday. If a fracture had started along one of the joints it would extend rapidly in the kind of iron that the boiler seems to have been made of.

The pitch of rivets in the lower shell being 2⅛-inch, and the diameter of the rivet holes being $\frac{13}{16}$-inch, the strength of the joint was about 62 per cent. of the strength of the solid plate. If we take the lowest strength found in the tensile tests afterwards made—35,000 lbs.—we have, as the bursting pressure:

$$(35{,}000 \times .62 \times \tfrac{3}{8}) \div 30'' = 271 \text{ lbs.}$$

This, of course, assumes that the workmanship was perfect, and that there was no deterioration by grooving or corrosion. With a factor of safety of 5, the safe working pressure would be 54 lbs. If the boiler was habitually run at 80 lbs., the pressure no doubt exceeding this by a few pounds at times, it is not difficult to believe that the metal may have been strained beyond its elastic limit, and a fracture developed at the joint in the course of time, as our inspector has suggested. This is particularly likely to have been the case, if we take into account the poor quality of the iron, as shown by the tests.

The boiler-house was annihilated by the explosion, and the post supporting the outer corner of the office of the mill was knocked away, so that the office and its contents fell to the ground, but, fortunately, no one was in it at the time. Most of the glass on the boiler-house side of the mill was broken, but no further damage was done to the mill, and little or none to the machinery.

The hands that ate their dinners at the mill were in the habit of going into the yard after dinner to play ball. Had the explosion occurred 10 or 15 minutes later, there would have been a dozen or more of them in the yard playing, and the loss of life would probably have been considerable. Two boys,

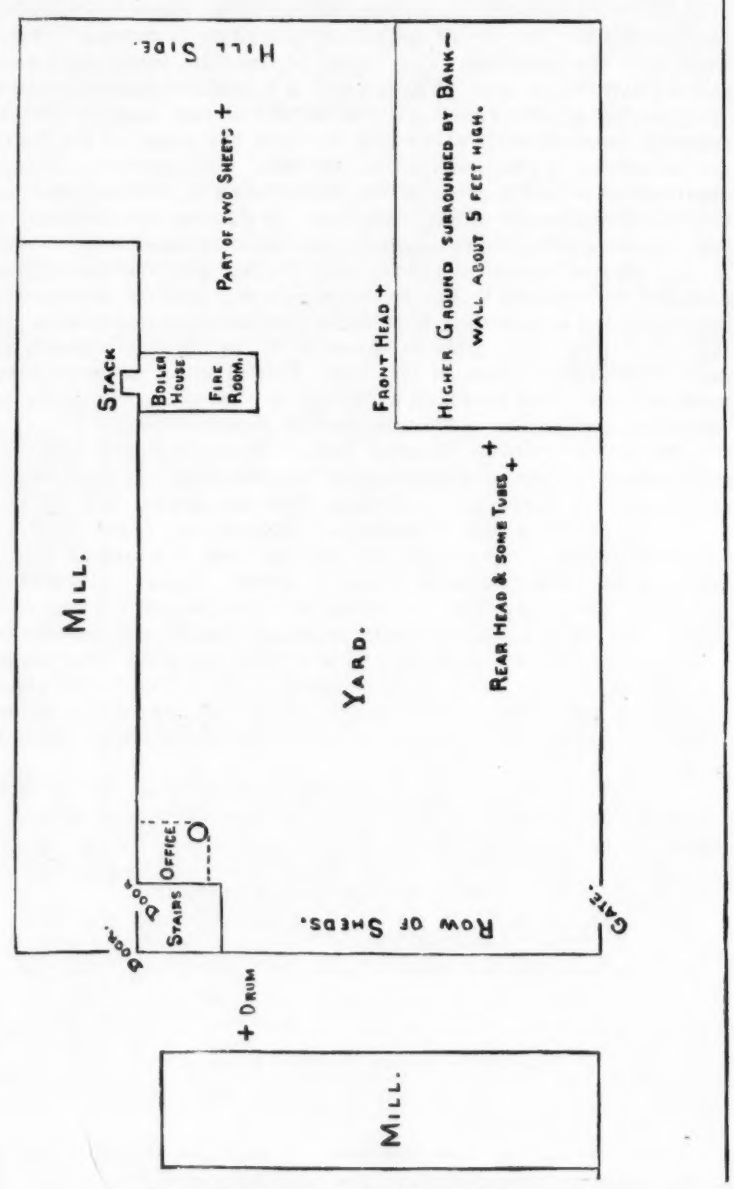


FIG. 2.—PLAN OF MILL AND YARD.

who came to bring some of the hands their dinners, were killed. There was no other loss of life and nobody was injured.—[The Locomotive.

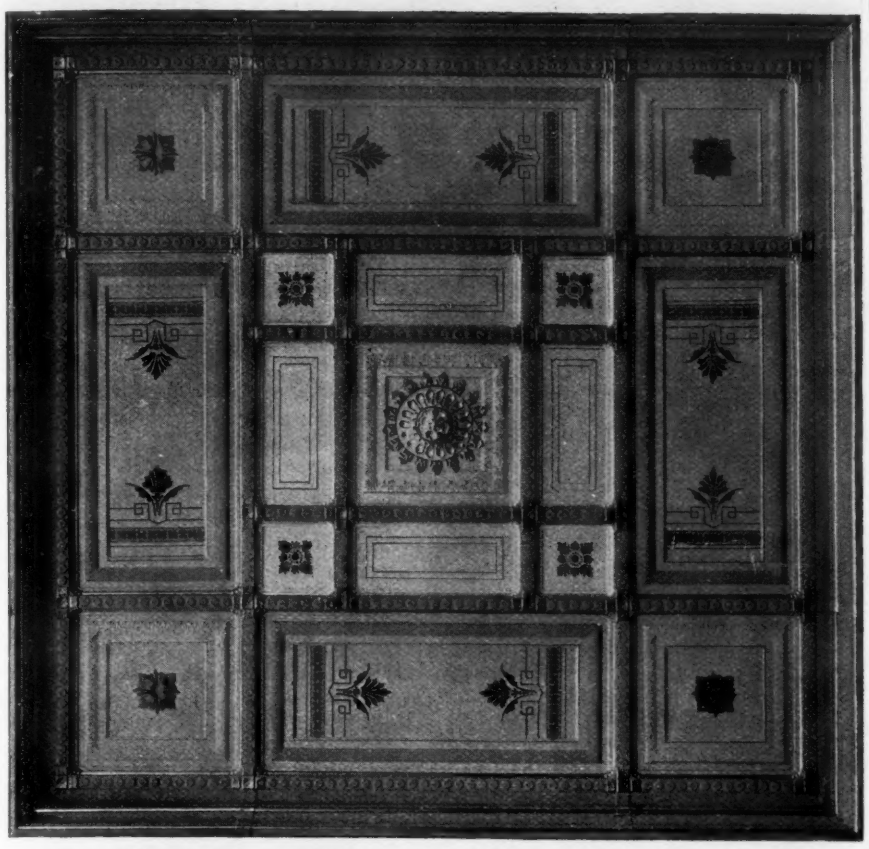
Liability on Unpaid Stock

Under the laws of Wisconsin stockholders who have paid less than its par value for their stock, are liable to creditors of the corporation for the difference between the amount they have paid and its par value, and a creditor seeking to enforce this liability need not allege ignorance of the fact that the stockholders had procured their stock for less than par, nor that the credit was extended on the faith that par was paid for the stock.—[Gogebic Investment Co. *vs.* Iron Chief Mining Co., Supreme Court of Wis., 47 N. W. Rep., 726.

SHEET STEEL CEILING.

Among the many well-known firms in the sheet steel ceiling manufacture none are better known than The Kinnear & Gager Co., of Columbus, O. The above firm manufacture one of the prettiest as well as one of the least expensive ceilings made. This ceiling is rapidly finding its way into stores, halls, public buildings, opera houses, churches, cars, club houses, and, in fact, all modern equipped places where elegance and durability are desired at a small expense. This steel ceiling is made in the most artistic designs and is one of the latest inventions of the day.

We present on this page a cut of one of their new ceilings, and to say that the time is not far off when this ceiling will predominate over all others is not an exaggeration in the least. One of the things usually considered in building a structure is the beauty as well as the durability of the ceilings, and the



steel ceilings have several points of advantage over the wood and plaster ones Take, for instance, the plaster ceiling and put it beside such a one as we illustrate and the difference can immediately be observed. The steel ceiling is absolutely fire-proof, as it is made of soft sheet steel. It is guaranteed against warping and buckling, and it is so constructed that the joints cannot be seen. This ceiling cannot be affected by water but can be washed without possible injury to it. It can be decorated to suit any one and it is attractive, durable and sufficiently decorated for any parlor. It is fast supplanting the old-fashioned lath and plaster, wood and corrugated iron ceiling. The designs are handsome and admit of great variety.

The Kinnear & Gager Co. have just issued a new catalogue which they will be pleased to send to any one who is interested in this enterprise.

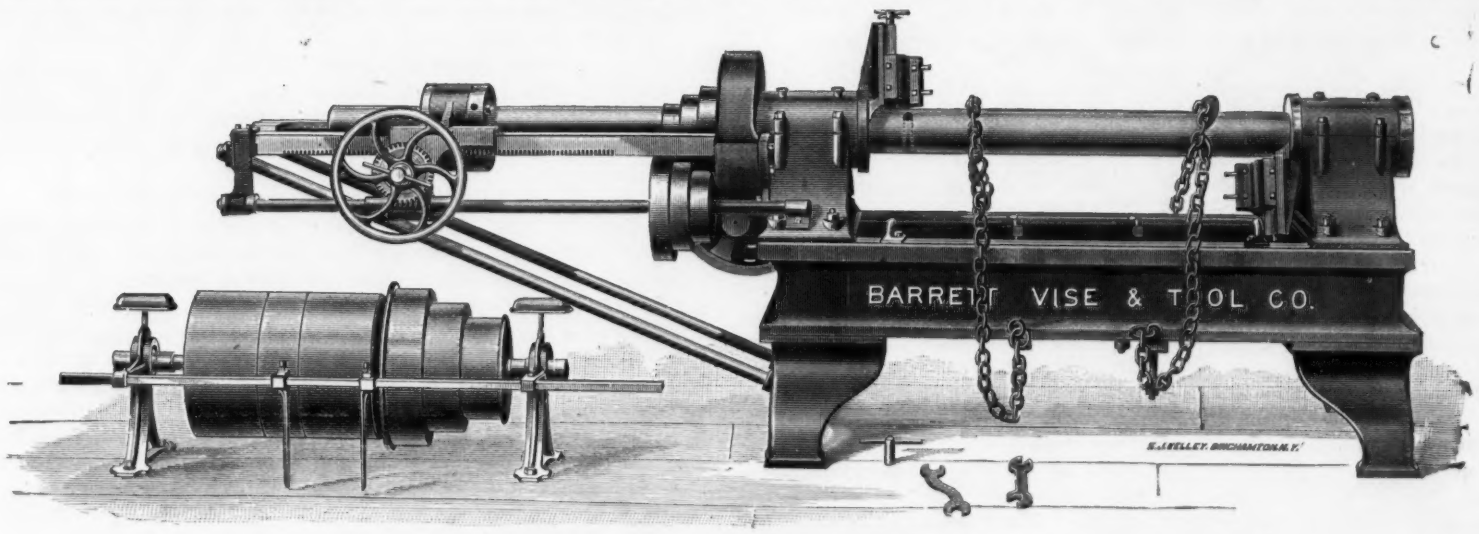
Test of Southern Iron.

At the Harriman Foundry & Machine Works, Harriman, Tenn., there was recently cast, out of an ordinary every-day cupola, a bar of iron four feet six inches long and one inch square. The bar was cast horizontal, in open sand —what is termed "open sand casting." After it became cold the bar was put to a transverse strain, the distance between supports four feet, allowing three inches at each end to rest on supports. There were no preliminary steps taken for the test, therefore one end of the bar rested on the sill of the shop, the other end being blocked up. After this was done weights were carefully weighed and gradually put on, suspended by a small rope in the middle of the bar. When the weight had reached 501 pounds, one of the employes by some mishap struck the partition with a hammer; from the sudden vibration of the blow the bar broke. It is thought that had not this accident occurred the weight would have reached 520 to 530 pounds (501x4 = 2,004 pounds for one foot). The best test so far recorded for one inch square cast iron 12 inches between supports is 2,580 pounds, and this iron was selected and test pieces made special. The brand of iron (no mixture except itself) from which these test pieces were cast, was a number 1 foundry made at Rockwood (Tenn.) furnace.—[American Manufacturer.

BARRETT IMPROVED BORING MACHINE.

This machine, manufactured by the Barrett Vise & Tool Co., Meadville, Pa., is adapted to bore and face engine cylinders, boring guides, piston rod hole and stuffing-box and facing ends of frames, in fact, all places where a true and smooth bore and face is required. It has a heavy bed, 6 feet long, 26 inches wide by 10 inches deep. Boxes on frame are 11-inch bearing, bored 6¾ inches, in which sleeves are fit. The bar fits in sleeves. In said bar a keyseat is cut to fit key in sleeves. The sleeves revolve in the boxes and bar slides through sleeves. By this arrangement the wear is reduced to a minimum. Attached to the sleeves are facing blocks which are moved by a star feed that can be set to feed in or out by moving a trip, and the bar is driven by worm and worm-gear, geared 31 to 1; this is a powerful feed and steady movement and noiseless. The driving shaft is steel, 2 and 3-16 diameter, running in the boxes each 7-inch bearing. The end of the shaft is hardened. In outside bearing there is a steel step to take thrust of shaft. The cone pulley on driver shaft has three steps, 3½ wide by 10½, 13½, and 16½ inches in diameter. To handle bar there is an extended frame well supported, on which a cross-head slides, said cross-head carries a sleeve that revolves in cross-head; in sleeves there is a key or feather that fits keyseat in bar, and is tightened by set screw in sleeve. By this arrangement the bar can be handled at will. The feed is a rod feed, commonly used on lathes. On main sleeve there is a cone pulley with three steps and one shaft running parallel with extending frame; there is another cone pulley which drives shaft. On shaft there is a worm held in position by apron attached to cross-head, said worm drives worm-gear on shaft running through cross-head on cross-head shaft. There are pinions working in rack cut in extended frame, also a hand wheel fastened by feather that can be locked to worm-gear by friction when desired. The changes of feed are 1-16, ⅛ and ¼ inches. Length between facing blocks, 3 feet, and will face 28 inches outside diameter. There is a chuck for holding cylinder, and if wanting to face head or bore stuffing-box and guides, the outside box can be removed. The bar is of hammered steel 5 inches in diameter. All racks and pinions are cut from the solid; floor space, 6 feet by 26 inches; extended frame, 4 feet; speed of counter shaft, 150 revolutions.

Among other establishments using this machine we can name the following: Oil City Engine & Boiler Works, Oil Gity, Pa.; Cleveland & Hardwick, Erie, Pa.; Erie City Iron Works, Erie, Pa.; Springfield Thresher & Engine Works, Springfield, O.; Russell & Co., Massillon, O.; Dean Bros. Steam Pump Works, Indianapolis, Ind.; Canton Steam Pump Works, Canton, O.; Galvin Brass & Iron Works, Detroit, Mich.; Nichols, Sheppard & Co., Battle Creek Mich.; Lansing Iron & Engine Works, Lansing, Mich.; The Brownell Co., Dayton, O.; Houston, Stainwood & Gamble, Covington, Ky.



BARRETT IMPROVED BORING MACHINE.

A Great Bridge.

The great steel bridge across the Columbia river, at Vancouver, will be a mammoth concern. It will be 6,000 feet from the Washington to the Oregon shore; and it will be double tracked, with roadway on top for teams, and will be erected upon pneumatic piers. The pivotal pier, or draw pier, will support a draw which will give an opening of 200 feet space on either side for vessels to pass, and the span immediately south of the draw span will be 375 feet. Whole structure to be of steel, built 10 feet above the high water of 1876, and 40 feet above low water. On account of the sandy formation it will be necessary to go down 80 feet below low water to get a firm foundation. This gigantic structure will cost over $4,000,000. It will be January 1, 1892, before the cars can pass over it. The company is pushing the bridge and also the road as fast as men and money and their present perfected plans will permit.

PRESENT STATUS OF THE COKE STRIKE.

The Connellsville (Pa.) *Courier*, of May 15, gives the following as the "real status" of the coke strike:

The claims of the coke operators and strikers as to the number of men at work at the different coke plants are so widely different, albeit so positive, that an ordinary observer on the outside is puzzled to know what the situation really is.

However, thanks to the statistics of the *Courier*, he needn't be kept in the dark. There is unbiased testimony as to the situation, in the shape of cold figures that don't lie. The weekly record of coke shipments, obtained, not from the operators nor the strikers, but from disinterested third parties, the railroads, is a fair index of the weekly status of the strike. The strike began February 10th. Following is the record of shipments from that date to the present:

	Cars.
Week ending February 14	1,769
Week ending " 21	330
Week ending " 28	192
Week ending March 7	290
Week ending " 14	584
Week ending " 21	530
Week ending " 28	614
Week ending April 4	693
Week ending " 11	1,086
Week ending " 18	1,350
Week ending " 25	1,571
Week ending May 2	1,865
Week ending " 9	2,184

The week following the inauguration of the strike, the shipments dropped to 330 cars, and the following week to 192. During the fifth week of the strike the amicable resumption of Pennsville and Percy, and the defiant resumption of Fairchance, together with the continued operation of Rainey's works, brought the shipments up to nearly 600 cars, or about 100 cars per day, at which point they remained until an active effort was made to start up some of the Frick and McClure Works, the first week in April. The shipments then jumped from 600 to 1,000 cars per week. Since that time, it will be noticed, they have been increasing regularly at the rate of about 300 cars per week.

Three hundred cars will contain over 5,000 tons of coke. One oven running regularly will produce about 10 tons of coke per week. To produce an increase of 5,000 tons would require 500 newly fired ovens. On an average, it requires one man to operate an oven. The increased shipments, therefore, mean that the working force of the coke region is being steadily increased, despite any and all alleged desertions, at the rate of 500 men per week.

The shipments of last week indicate that there are upwards of 4,000 men at work in the region. The region when running full employs 16,000 men. But it is estimated that 60 per cent. of the ovens will supply all the present or immediately prospective demand for coke, and to operate them only 60 per cent. of the number of men are required, namely, about 9,600. By a simple process of arithmetic it will be seen that, at the present rate of increase, the operators will have all the labor they want within nine weeks, and that, at best, the beginning of July will see an end of the strike. It is probable, however, that it will end much sooner than this, for the reason that the clearer the end is seen the greater will be the falling away from the strikers' ranks.

In the face of these conditions, we cannot but think that a continuance of the strike is, on the part of the strikers, worse than folly.

It's a wise man that knows when he's whipped.

THE RUSSIAN IRON AND STEEL INDUSTRY.

From an official report just issued on the Russian iron and steel industry, during the ten years of 1879–88, it appears that in 1888 there were under working in the entire Russian Empire 612 iron mines, and iron ore was further raised from 149 lakes. Of the former, 522 were situated in the government of Ural, and of the latter, 132 in Finland. The total output of ore amounted to 1,381,000 tons, of which 42,000 tons were lake ore. Compared with 1887, there was an increase of 75,500 tons. Naturally, the Ural shows the highest output —778,000 tons. The number of foundries producing pig iron was 132, with 200 furnaces, producing 612,000 tons, of which quantity more than three-fourths was smelted with charcoal. Again, the Ural shows the largest output—nearly 400,000 tons. The largest make at one works was 50,000 tons, viz., by the foundries La Nouvelle Russe, in the government of Catherinoslaw, where, by the way, coke is solely used in the smelting. Compared with 1887, the make of pig has increased with 52,000 tons, or nearly 9 per cent. During the period, 1879–88, the manufacture of pig iron in Russia has increased by 230,000 tons, or 54 per cent. Up to 1886 the increase was slow, amounting only to some 90,000 tons, but since there has been a rapid progress. The greatest increase, 41 per cent., occurred in the district of Moscow.

The Russian bar iron industry shows but slow progress during the period 1879–88, the total increase being only 81,000 tons. In 1888 there were 173 works engaged in it, the make amounting to 350,000 tons, an increase since 1887 of only some 4,000 tons.

Like the bar iron industry, the Russian steel industry advanced insignificantly in 1888, the manufacture amounting to 211,000 tons, or only 3,000 tons more than in 1887. The production has decreased as much as 37 per cent. in Finland, on account of the standing-still of the largest steel works in that country, but increased in other provinces. At the works of the well-known Muta Bankowa Co. the increase of manufacture amounted to 3,500 tons. During the decennial period referred to the manufacture of steel in Russia has fluctuated very much; for instance, 1880 shows a production amounting to 300,000 tons, whereas in 1885 it had declined to 180,000 tons. Of the quantity produced in 1888, 1,100 tons were made by casting, 2,300 tons by puddling, 49,500 tons by the Bessemer, 144,000 tons by the Martin process, and 4,100 tons by the Franche Comte process. The number of steel works in the country was 32. The manufacture of steel rails amounted to 61,000 tons. As regards the relation between the consumption and production of iron in Russia, it appears the country supplied in 1888 90 per cent. of the pig iron required, 85 per cent. of the bar iron, and nearly 96 per cent. of the steel.

$1,000,000 IN DIVIDENDS PER YEAR.

As a practical demonstration of the accumulative values of lands situated in a growing city, and the claim justly made, that the more lots that are sold the more there are (in value) remaining, the statement of the Elyton Land Co., of Birmingham, Ala., recently made by their President, Mr. H. M. Caldwell, is quoted:

"The Elyton Land Co. was incorporated in 1870, with a cash capital of $100,000, which was expended in land, The capital stock was then fixed at $200,000. In the year 1883 a dividend of $200,000 or 100 per cent., on the capital stock, was declared. Since that time dividends have been paid as follows:

	Per cent.
1884	95
1885	45
1886	340
1887	2,205
1888	100

"Amounting in the aggregate to $5,570,000 paid in dividends on the stock in six years upon an investment of $100,000. The property now owned by the company is worth probably $5,000,000.

"The stock of the company sold a few years ago at $4,000 a share. It sold in 1876 at $17 a share."

The city of Birmingham, Ala., was built on the lands of this company, who owned less than the Georgia-Alabama Investment & Development Co. now own at Tallapoosa, Ga., and these enormous values have been created by building on the properties a city of only about 25,000 inhabitants, as shown by the last census.

As the Georgia-Alabama Investment & Development Co. own all their property entire, without indebtedness or deferred payments, the receipts from all sales of city lots must go at once to the surplus of the company to increase the semi-annual dividends in addition to the earnings from its manufacturing establishments.

Every sale of city lots or property made, instead of decreasing the assets of the company, increases them three-fold by reason of the improvement and development that must necessarily follow, the benefits of which accrue to the remaining property owned by the company, increasing very largely its desirability and selling value.

Prospectus and further particulars can be secured personally or by addressing the Boston office of Georgia-Ala. Investment & Development Co., rooms 8, 9 and 10, Globe building, Boston, Mass.—[New York Daily Press, March 18, 1891.

The Employers' Federation

A federation of employers is in progress of organization in San Francisco, which will include the foundrymen, ship owners, lumber dealers, box makers, builders, harness and leather makers, etc. The idea is to form a federation of employers of the Pacific coast, on the same plan and to be just as extensive as the organization of trades unions in the Council of Federated Trades, with its sub-federations in all parts of the coast, so that, no matter in what trade or locality the Council of Federated Trades might exert its power, it would meet an equally compact organization to oppose its decrees. It is not proposed to attempt to destroy trades unions, but to restrain them and to resist unreasonable demands; nor is it desired to reduce wages, but to so arrange matters that employers shall not be dictated to as to the individuality of employes. A committee is to be appointed, selected from the different industries, which will constitute a court of final appeal in disputes. The decision of the committee will have the power of the federation to sustain it.

Progress of the Nicaragua Canal.

Though the force of men employed on this great work is small at present, progress is being steadily made. The pier at Greytown, which is to be built to the outer bar, a distance to about 2,000 feet, is complete for 800 feet, and 200 feet more is well advanced. The channel into the harbor thus formed is being dredged and is already about 9 feet deep at low tide. The canal cut has been opened for a distance of 1,200 yards to a depth of 16 feet and a width of 250 feet. A second set of dredges will deepen it to 35 feet. Nine miles of railway have been completed and the tenth mile is graded. The buildings and plant of the company are satisfactory in the main. The line on the Pacific side has been cleared for a portion of the way, some blasting has been done in the River San Juan, and the eastern division has been cleared as far as the Divide. The final survey of the line cost $400,000.

The Harvey Nickel Steel Armor Plates.

The recent tests of steel armor plates at the government proving grounds at Indian Head, Md., resulted in a substantial victory for the Harvey nickel steel plates. Three kinds of plates were tried—Harvey nickel, nickel and steel, and steel plates. The steel plates were shattered, the nickel and steel perforated, but the Harvey nickel plates withstood the projectiles perfectly, and were not punctured at all. Each plate had 26-pound projectiles fired at it from a Hotchkiss gun at a distance of 35 feet, striking the plates at a velocity of 1,800 feet per second.

To Celebrate.

Take the Nickel Plate, May 29th or 30th, and travel for one fare for the round trip, Decoration Day, returning to and including June 1st, 1891.

THE York Iron Co., Milwaukee, Wis., announce the appointment of Messrs. Runyon, Mack & Co., of Cleveland, as sales agents of the Dunn ore produced by that company.

LAKE SUPERIOR MINING NOTES.

MARQUETTE RANGE.

Several of our townsmen, among them Messrs. W. G. Watters, C. R. Ely, Jas. Ames and Wm. Wills, have been prospecting for iron ore just southeast of the old Saginaw mine for some months past, and now have a very fair prospect for developing a mine.—[Ishpeming Iron Ore.

Iron ore in large quantities is said to have been found at the Anvil mine, the extent of which is not yet known.—[Peninsular Record.

At the Negaunee, there are about 30,000 tons in stock, all of which, with the exception of a few hundred tons, is a good grade Bessemer.—[Florence Mining News.

Nearly all the mines in Ishpeming are sending ore to lake ports so as to make stockpile room. No sales amounting to anything have been made. The new time card of the North-Western was issued recently, but few trains are moving as compared with other seasons.—[Florence Mining News.

J. O. St. Clair, manager of the Riverside, was in Ishpeming recently, and reports that property as steadily improving. They have the slate ore formation, but as yet have been unable to prove up the ground by drifting. They find considerable water, three pumps being employed in lifting it, and as steam has to be conveyed for a distance of 1,200 feet, they need additional of this power before much can be done in the exploring of the new ground upon the foot side of the present black ore vein. The management is well pleased at the way the mine is proving up.—[Florence Mining News.

At Cleveland Lake, shafts Nos. 1 and 2 work is moving along finely. The drifts from the two shafts are making towards each other, and in the course of a week or two will meet, if no unexpected obstacles are encountered.—[Florence Mining News.

GOGEBIC RANGE.

The report circulated the first of the week that the Norrie had sold 350,000 tons of '91 ore was rather slow to be generally credited, because of similar rumors earlier in the season that had turned out to be without foundation. But when the railroad people a day or two later got orders to arrange for six daily ore trains it was evident enough that this time it was a go. On Thursday the actual shipments began, the ore going principally via Escanaba, the sale referred to being to the Illinois Steel Co. A considerable amount will also be sent to Ashland, bringing the total daily shipments up to about 4 500 tons. This is the opening of the shipping season for the Gogebic range, and it is hoped that other sales and shipments will shortly follow.—[Pick and Axe, May 16.

The Comet has about 15,000 tons of ore in stock, and Capt. Mitchell is at present devoting most of his attention to developing work. Two new shafts are being sunk on the property, and an additional one on the Norton (formerly Pittsburgh) adjoining.—[Pick and Axe.

Capt. S. H. Webb feels quite encouraged over the present showing in the Windsor. The development shows a very fine lens of ore, which has been opened up for a length of some 75 feet. The Windsor is evidently all right and will be the making of a good mine.—[Florence Mining News.

The Superior has never in its past history had so good a showing of ore as at the present time. The workings in all parts of the mine are in good clean ore and the indications are very favorable. The Superior seems to have struck settled ground at last, and rich ground besides.—[Florence Mining News.

The diamond drill workings of the Norrie, on the Ironwood townsite, is down 1,020 feet. Work is going on with a 3-inch rod, at present, an accident some time ago having caused the 2-inch drill to get stuck at a depth of over 1,200 feet. The hole is being rimmed now.—[Florence Mining News.

MENOMINEE RANGE.

At the Commonwealth Co.'s new find 15 teams are engaged in stripping, and are doing good work. The ledge has been reached in one corner of the pit. The drift from exploring shaft No. 7 is now 60 feet in ore, and the entire find is improving in character every day. Two new permanent hoisting or "working" shafts were started early in the week on the footwall side, at an angle of 70°, and will have but a short distance to drift to reach the ore vein. The original or exploring shafts will be used as winzes, air shafts, etc. The company has made a sale of the product of the new mine, and the indications now point to the commencement of shipping operations in about two months.—[Florence Mining News.

Capt. James Tobin and several other Florence gentlemen have a small force of men exploring on the "40" adjoining the Commonwealth Co.'s new find. This is the option formerly held by Capt. J. N. Porter and others, and a considerable amount of exploratory work was done at the property last year. The near presence of the new find is an almost sure guarantee that the present option holders will meet with good success in their search for ore.—[Florence Mining News.

The famous legal contest over possession of the Sunday Lake iron mine, which the stockholders and the fee-owners have waged for four years, has been decided in favor of the company, by the Supreme Court of Michigan. The litigants are Milwaukee people, and the case is a very interesting one. The decision has just been announced.—[Menominee Range.

At West Vulcan the new shaft is something more than 600 ft. deep. The drift has been connected with the crosscut at the 7th level and after some necessary preparatory work has been done, it is probable that some ore will be mined from the north vein in the vicinity of No. 4. Connection will be made with the south vein also, but it will be some time before any ore can come from there. The pumps will soon be busy lowering the water in No. 2 shaft, below the sixth level. This water will be pumped to the third level and run to the new shaft to be taken care of by the big pump.—[Current.

Have you heard that the Great Western mine has closed down and would remove the pumps? Don't you believe it, because there is no truth whatever in the report. Some men were laid off last week, but the force will be renewed and mining commenced again next week, and continued for an indefinite period. The stock dock contains 15,000 tons of ore.—[Diamond Drill, Crystal Falls, May 16.

The Mansfield has all its levels "clear" again and continues to work with its regular force of men, shipping its good Bessemer as usual.—[Florence Mining News.

The Shafer mine will be a busy place this season. A large lot of ore has been sold to the Thomas Iron Co., of Pittsburgh, and the Illinois Iron & Steel Co., of Chicago, which will be removed and shipped as quick as possible; shipments to Escanaba were commenced this week. Supt. Jennings informs the writer that the third level of the mine will soon be opened, and then "we will show you some hustling."—[Diamond Drill, Crystal Falls.

Taking a look at the mining industry of the Crystal Falls iron district, one is at once impressed with the idea that it is to be a very busy year for the mines, instead of a very dull one, as has been generally predicted. All of the mines in the district with the exception of three are working and preparing for a Summer almost equal in activity to last season. The Shafer, Mastodon, Dunn, Monitor, Hemlock, Paint River, Great Western, Crystal Falls and Mansfield mines have all sold some ore, and are working just as hard as though they had each sold all that could be mined, and for all that the writer knows, perhaps they have. Activity at the mines causes good business to the merchants in town, and taking all together we expect a fairly good year in all branches of local business. The Crystal Falls iron district is the busiest mining center on the Menominee range.

The Late Hon. Henry W. Grady on Tallapoosa, Ga.

"The era of city building in the South marks an industrial revolution never before accomplished in times of peace in the world's history.

"The words, 'city built by magic,' have been used time and again, but never have been realized until the present boom in Southern properties.

"The stories of Kansas City, Omaha and such Western prodigies are tame compared to Birmingham, Anniston and other Southern cities. This era, it appears, has found a climax in the history of Tallapoosa.

"This city is situated near the Alabama line, on the 'River of Gold.' It does not, as Birmingham and Anniston do, depend on iron alone for its prosperity, but has an abundance of marble, iron deposits equal to the best, copper, gold and exhaustless wealth of timber land. It is, besides, in the very best farming region of the Southeast, with railroad facilities and new railroads being built. The company controlling it, the Georgia-Alabama Investment & Development Co., is a strong one, with plenty of nerve and capital absolutely ad libitum. Settlers are going in from all sections of the country, and town lots are being sold with great rapidity. There seems to be nothing of the fictitious boom about Tallapoosa; it rests on a solid basis and is having a solid growth. It bids fair to lead in the famous cities of the South in the race for progress which is now challenging the attention and admiration of the world."

A Remarkable Run of Iron.

The Mancelona (Mich.) *Herald* says: Stack No. 2, blast No. 1, of the Antrim Iron Furnace, completed the third year of its present blast April 15. Number of days in blast, 1,050, and the total product during that time amounted to 66,347 tons of pig iron—a daily average of 63½ tons. A trifle over a year and a half of this run, or, to be exact, 582 days of it, the stack was blown with a small Wiemer engine, with a product of 32,326 tons—a daily average of 55⅔ tons. The balance of the run (468 days) was made with a large engine of the same make, during which time the product amounted to 34,021 tons—a daily average of 72⅔ tons.

To make this amount of iron 115,410 tons of ore was used, and 146,000 cords of wood consumed. Had the stack been blown during the entire period with the large engine, the total product would, of course, have been much greater, but the record is a remarkable one, nevertheless, and it is believed that no charcoal stack in the United States has ever made so long a run or so large an amount of iron with a single lining.

Improved Hot Blast Furnace.

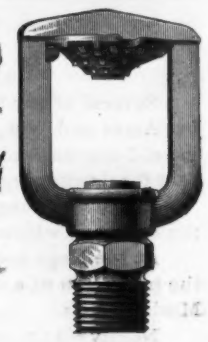
Mr. John Dixon, iron manufacturer, of Wolverhampton, has obtained a patent for employing the heat derived from the furnace for heating the air blown into it to smelt the contents. The mode of carrying out this plan is by letting into the brickwork, on all sides of the furnace, several chambers immediately over the tuyere pipes, within about three inches of the inner face of the furnace. These chambers enclose a bent tube—or, instead of a tube, passages may be made therein—through which cold air passes, supplied by any blowing apparatus, and in its course becomes heated; the hot blast thus produced will find an exit through the tuyeres into the furnace. When air of great heat is required it is proposed, in place of the brickwork, to face the air chambers with clay or stone work, perforated with holes, through which the heat of the furnace passes direct to the chambers. Instead of the heat of the air passing off from the chambers, as above mentioned, it may be carried away from the furnace by pipes, and be used for any other purpose. —[Wolverhampton (Eng.) Chronicle.

Harney Peak Tin Operations.

The mines now being worked by the Harney Peak Co. are steadily gaining depth, and are all in good ore. Some good ore has lately been encountered in the bottom of the Addie. A drift is being run in the Nevada on the hanging wall of the 90-foot vein, which has been in good ore the entire length of the drift, 80 feet. In the Coats a crosscut is being run on the 300 foot level to strike the ledge, which from the surface has shown a tendency to veer frequently from the general dip, making it necessary in sinking a working shaft to run across cuts at all levels. A station will also be made at this point.—[Mining and Scientific Review.

PROTECTING YOUR BUILDINGS With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.

☞ Write us.



THE NERACHER SPRINKLER CO., - WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh.

CRANDALL'S EXPANSION RING.

Crandall's expansion ring packing, improved, herewith shown (Fig. 1) is the result of much thought and experimenting by a practical engineer. In it there are combined three objects wished for by all engineers, *i. e.*, *durability, tightness* and *convenience*. It has been thoroughly tested, and is now in use

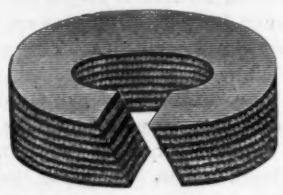
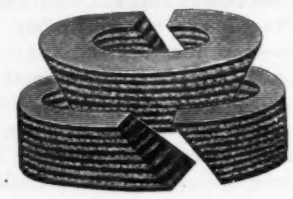


FIG. 1.



FIG, 2.

in many of the largest steam industries in the United States. Superiority is claimed over all other packings for the following reasons:

First. It is made a perfect fit for the rod and stuffing box, and is easily and quickly placed for use.

Second. It is made of the best cotton, duck and rubber, manufactured expressly for our use.

Third. The lubricating qualities are forced into this packing by a patented process in cold oil, by hydraulic pressure, which thoroughly saturates the fiber without weakening the gum, the packing coming out tough and elastic. This, it is claimed, renders it much more durable than other ring packings, all of which, so far as known, are subjected to a boiling process.

The rings are made any size from ⅝ inch to 30 inches.

Fig. 2 shows regular ring cut sectional. It is designed for rods out of center, cut rods, ammonia and places that are difficult to keep tight otherwise. It can be so cut, however, only when the rim of the packing is quite heavy. Manufactured by the Crandall Packing Co., Palmyra, N. Y.

Newport News Shipbuilding and Dry Dock Co.

One of the most extensive enterprises lately projected in this day and land of extensive enterprises, is that of the Newport News Shipbuilding & Dry Dock Co, whose plant, covering many acres of ground, is located at Newport News, Va. The various shops are necessarily separated from each other, and the primary engineering conditions are such as to demand the subdivision of power almost as a necessity. The key to the successful subdivision of power was found in the use of a type of engine, whose specific economy in moderate sizes should be as good, or better, than that of a single large central engine; and further, in the use of some practical device for preventing the dangerous accumulation of water in an extended system of piping, and for returning all condensation to the boilers as a measure of economy. This contract, comprising engines and steam loops, was awarded to Westinghouse, Church, Kerr & Co., and comprises, up to date, seven independent Westinghouse compound engines, as follows: One 80 H. P., one 130 H. P., four 200 H. P., and one 340 H. P., each protected by a separator and steam-loop. A central boiler plant of high-pressure boilers supplies steam to these engines, most of which are several hundred feet distant, and also to sundry pumps and other steam machinery. The steam mains, which commence with a diameter of 14 in., are laid in an interesting and original manner. To go overhead was out of the question, and the problem of an underground line was a difficult one, on account of the nature of the ground, which, for the most part, is soft silt, flooded at high tide. A sub-way was therefore constructed by sinking a large steel tube of sufficient diameter to carry all the steam and water pipes with the steam-loop returns, and allowing ample head room for inspection. Y branches and eccentric reducers are freely used, and expansion is taken care of by copper bends at the angles. The steel subway itself is used as a hot air duct, distributing from an indirect system with fan-blast for heating the various buildings. High-pressure steam at about 150 lbs. is carried through the entire system. The return system at present consists of six separators and 13 steam-loops, all entering into one common 4-inch return, which lies parallel to the steam pipe in the steel tunnel above described. We regard the above departure in steam engineering as of great importance to the heavier class of manufactures in solving the problem of distance and economy for the first time in a thoroughly practical manner.

INDUSTRIAL SUMMARY.

New Enterprises:—

It is reported that the American Screw Co, of Providence, R. I., will establish a plant in England.

At Florence, Ala., R. J. Hoffman, C. E. Jones and W. J. Flanagin have organized the Detector Lock Co., to manufacture locks.

M. H. Whitcomb and others have organized the Horton Machine Co., Holyoke, Mass., for the manufacture of emery grinding machinery.

Nixon & West are erecting works at Chattanooga, Tenn., for the manufacture of brass and iron shelf hardware, including casting and finishing.

The Beecher Manufacturing Co's. plant, at Meriden, Conn., has been purchased by the Peerless Button Hole Attachment Co., who will begin the manufacture of a patent wrench.

It is said that the Rolled Steel Wheel Co., of Pittsburgh, will erect a plant at Kensington, on the Allegheny river, to manufacture steel wheels for vehicles and other specialties. The capital stock is $600,000.

The plans for the American Manufacturing Co's. new foundry and factory to be erected at St. Paul, Minn., includes a foundry 110x50 feet, one story high, costing $10,000, and a factory two stories high, 100x40 feet, to cost $20,000.

The S. J. McCormick Co., of Pittsburgh, Pa., for the manufacture and sale of foundry, facing and mill supplies, with a capital of $50,000, has been chartered. The directors are John S. McCormick and Frederick S. Hamm, of Pittsburgh, and M. Hawley Treadwell, of New York City.

Bangor is to have another industry in the shape of a stove foundry. Work was begun on the foundations of the new buildings, which are to be equipped with the latest improved machinery. This concern will be known as the Noyes & Nutter Manufacturing Co., and expects to assume business responsibilities some time in August.

An application for a charter will be made for an intended corporation to be known as the R. D. Nuttall Co., Pittsburgh, Pa. The company intends to manufacture machines and machinery of all kinds. The men interested in this concern are R. D. Nuttall, Thos. L. Shields, F. E. Cannon, John Jackson and O. S. Richardson, Pittsburgh.

The Wilkes Rolling Mill Co. has been organized at Sharon, Pa., by J. B. Wilkes, S. Wilkes, W. Foxall, J. O. Davis, W. Wilkes, Jos. Wilkes, Jos. Anderson, Chas. Anderson and Geo. Bugg. The parties named are all practical iron men, and will manufacture muck iron. Mr. P. L. Kimberly has donated them a site on which to erect their works.

The Wilkes Rolling Mill Co., have been organized at Sharon, Pa, by John B. Wilkes and others, all practical iron men. P. L. Kimberly, of P. L. Kimberly & Co, Limited, proprietors of the Atlantic Iron & Nail Works, at Sharon, Pa, has donated sufficient ground near his works for the erection of the new plant, which will manufacture muck bar exclusively.

It is reported that the Elyton Land Co., of Birmingham, Ala., has subscribed $100,000 to the new steel company being organized with a capital of $1,000,000 to build large steel works at Ensley City, near Birmingham. This will undoubtedly insure the raising of the entire capital, as $300,000 will, it is said, be taken by the Tennessee Coal, Iron & Railroad Co., and Mr. T. T. Hillman, the projector of the enterprise, can be depended upon to carry it through successfully.

Builders of machinery will be interested to know that John L. Stevenson, 619 Pullman Building, Chicago, is asking bids for a complete four-mill tinplate plant, consisting of sheet mills, pickling machines, furnaces, cold-roll train, tinning sets, boilers, etc. This is a bona fide enterprise, in which reputable Chicago business men are interested, and the plant is to be located at Chicago. Full particulars will be furnished on application to Mr. Stevenson, who is an engineer of experience in the construction of steel works, iron works and tinplate works.

Hon. Lewis Miller, Col. A. L. Conger and J. F. Seiberling, with the stockholders in the various companies with which they are associated, together with capital from Canton, will organize a company to build large malleable iron works in Akron. The malleable iron works will be the largest in Ohio and will take rank among the foremost industries of the city, giving employment, when running at full force, to over 600 men. Just where the works will be located is not yet decided. Propositions for a site will be made by owners of the Miller farm in South Akron, by the South Akron Land Co. and by the

town of Barberton. Inducements will be held out to the company for the location of its works at each of these points and all are anxious to secure the prize. The organization of the company is assured and it will take place under conditions which will insure the absolute success of the enterprise.—[Akron (O.) Beacon.

Additions, Enlargements, Removals, etc.:—

A new 60-ton cupola is being erected at McKee, Fuller & Co.'s foundry, at Fullerton, Pa.

The Industrial Iron Works, at Bay City, Mich., are preparing to build an addition 255x90 feet to their works.

The Hendrick Manufacturing Co., of Carbondale, Pa., have broken ground for a new machine shop, 140x40 feet.

A Schenectady (N. Y.) firm are arranging to erect a foundry at Lansingburgh, N. Y., which will employ about 100 men.

It is reported that the Grand Trunk Railway has decided to build rolling mills and a forge, at Point St. Charles, Montreal, Can.

The plant of the Donaldson Iron Co., at Emaus, Pa., is to be improved so as to increase its facilities for making cast iron pipe and castings.

The Westminster Foundry Co, New Westminster, B. C., are making another large addition to their buildings to accommodate their rapidly increasing business.

The agricultural Implement firms of Massey & Co., of Toronto, and the Harris Co., of Bradford, Ont., are about to combine, with the view of controling the Canadian implement trade. The trust will have a capital of $5,000,000.

C. P. McWane & Co. have removed their foundry and machine shop from Wytheville to Graham, Va., where it will hereafter be known as the Graham Foundry & Machine Co., the Graham Land & Improvement Co. having subscribed for stock of the company, to the amount of $10,000.

It is given out that arrangements have been completed whereby the Western Iron Co., of Kansas City, Mo., manufacturers of bar iron, nuts, bolts, etc., will locate at Kennilworth Station, Ind., upon the Michigan Central line, midway between Gibson and Tolleston. The company will move from Kansas City as soon as buildings are prepared, and will begin operations with 350 employes. The plant at Kansas City is reported to be largely owned by the Eells, of Cleveland, and it is further rumored that it has been sold to parties who will remove it. The reason for moving is said to be that Kansas City is too far West for successful competition in iron.

Fires and Accidents:—

The foundry and machine shops of C. C. Page, at Oshkosh, Wis., have been damaged by fire to the extent of $30,000.

A fire in the steel works at Breaker Island, near Troy, caused a loss of $400,000. One thousand people are thrown out of employment.

The Coldwell-Wilcox Co.'s foundry and machine works, at Newburg, N. Y., were burned on the 7th inst. The loss is $35,000 and the insurance $20,000.

An incendiary fire destroyed the storehouse, two small buildings and stock to the value of $14,000 at the Laramie Rolling Mills, Laramie, Wy., recently.

The Albuquerque Foundry & Machine works at Albuquerque, N. M., have been totally destroyed by fire. The fire originated in the boiler room and was, no doubt, the work of an incendiary. The foundry, which was the largest in the Southwest, was started years ago by William Smith, now of Denver. The loss is not stated, but will probably reach $200,000.

General Industrial Notes:—

The Neracher Sprinkler Co. have opened an office at No. 57 William St., New York, and Mr. Fred G. Smith will be placed in charge, and will have entire control of their sprinkler in the New England and Middle States and Canada.

The spoke factory of the Gibson Manufacturing Co., Aberdeen, Miss, takes the ribbon on spoke making. Mr. C. E. Klaer, the Superintendent, says he has an operator by the name of John Mollon who has surpassed all records for fast work, turning out in one week of 58 hours 13,735 spokes. His best day of ten hours was 2,695 spokes, thus outstripping all previous fast day records. The lathe on which this remarkable work was done is the well-known Egan Co.'s (Cincinnati, O) improved automatic spoke lathe.

Mr. Frank H. Ball has terminated his connection with the Ball Engine Co., of Erie, Pa, and has sold all his recent patents and inventions covering engine governing devices to the Ball & Wood Co., 15 Cortlandt St., New York. This is a new company organized by Mr. Ball and others for the manufacture of improved Ball automatic cut-off engines. The new company has purchased 4½ acres of ground for a site in Elizabethport, N. J., where machine shops are being erected on the gallery plan, and are being equipped with new and modern tools.

The partnership heretofore existing under the firm name and style of The Harrison Safety Boiler Works, Germantown Junction, Philadelphia, Pa., has been dissolved by the withdrawal of Mr. Richard Norris, and another partnership formed by the remaining members, Messrs Jos. S. Lovering Wharton and Wm. S. Hallowell. They will retain the same name as before, The Harrison Safety Boiler Works. This firm make a specialty of the manufacture of the Wharton-Harrison safety boiler, feed-water heaters, etc. The business will be conducted as heretofore, without interruption.

The Neracher Sprinkler Co. last week closed the following contracts: Akron Rubber Co., Akron, O; Standard Tool Co., Cleveland; Cleveland Provision Co., Cleveland; Theodor Kundtz, Cleveland; Cleveland Woolen Mills, Cleveland; J. & H. Clasgens, New Richmond, O; D. M. Estey Furniture Co., Owosso, Mich.; J. L. Hudson, Detroit, Mich.; Wolverine Manufacturing Co., Detroit, Mich.; Upham Manufacturing Co., Marshfield, Wis.; Northwestern Lumber Co., Eau Claire, Wis.; American Textile Manufacturing Co., St. Louis, Mo.; St. Louis Distillery Co., St. Louis, Mo.; Greeley Burnham Grocer Co., St. Louis, Mo; Staver & Abbott Manufacturing Co., Chicago, Ill.; Hughes Lumber Co., Chattanooga, Tenn; Chattanooga Electric Light Co., Chattanooga, Tenn; Gutta Percha & Rubber Manufacturing Co, Toronto, Can.

The Jeffrey Manufacturing Co., whose success in the manufacture of mining machinery has been so remarkable, has opened an office and salesroom at 48 South Canal St., Chicago, where they will keep on hand a large stock of sprocket wheels, and a full line of roller and detachable chain belting, and all their special appliances for the rapid handling of materials, either in package or bulk. Their specialties include all kinds of conveyors and elevators for handling coal, ores, grain, stone, coal pilers, and railroad coaling stations. Their detachable chain belt will fit any standard make of wheels. The Jeffrey drill and coal mining machines, operated either by electricity or compressed air, are pronounced by mining engineers to be the best machines yet devised for the purpose. The shops from small beginnings now cover five acres and, owing to the rapid increase of their business, they have recently purchased three acres adjoining their works, on which, during the Summer, they will erect additional shops. Mr. John H. Gregg, who has a wide experience in their special line, is the engineer in charge of the Chicago branch.

Second-hand Corliss Engine for Sale.

Anyone wishing to obtain a genuine second-hand Harris automatic Corliss engine, made in Providence, R. I., can obtain full particulars of same by writing to the Economy Machine Co., No. 105 East Pearl Street, Cincinnati, O. Second-hand Harris automatic Corliss engines are not often to be had. Their reputation has been for many years so well known in many sections of the country, that this offers a very good opportunity for any readers of *The Iron Trade Review*, who use or may be in need of such an engine, to get one much less than a new one of that kind can be had for.

Decoration Day Rates

May 29th and 30th, returning to and including June 1st, 1891. Rates between all stations.

Rates Reduced

To one fare for the round trip via Nickel Plate, May 29 and 30, returning to and including June 1st, 1891. Decoration Day.

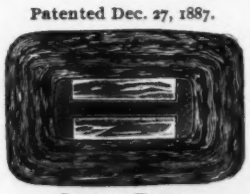
A Reduction in Price of Tickets

on the Nickel Plate, account Decoration Day, May 29-30.

May 29th and 30th.
One Fare
For the Round Trip.
Decoration Day
Excursions via
Nickel Plate.

It is not a Dead, but a Live Elastic Packing.

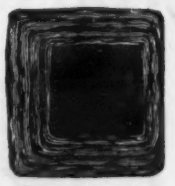
Patented Dec. 27, 1887.



BEFORE USING.

That will pack a Steam, Water, Oil, Air or Ammonia Rod, also a Smooth, Fluted, Out-of-Round or Vibrating Rod, an Engine, Pump, Ice Machine, Air Compressor, Steam Hammer, Rotary Rod, or any rod that has to be packed, and keep it tight without pressure or friction, as it works automatically.

We will prove this by yourself. If you will send for enough to pack a rod, we will send it on 30 days' trial, and prove to you that the "Sensible" Automatic Packing is the "Best" made, therefore is "Cheapest."



AFTER USING.

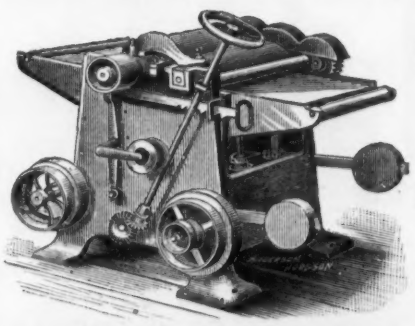
SOLE MAKERS:

Sensible Automatic Packing Co., 63 So. Canal St., Chicago, Ill.

FRANK & CO., BUFFALO, N. Y.

MANUFACTURERS OF

Band Saws, Scroll Saws, Universal Saw Benches,



Saw Mandrels, Pony Planers,
Matchers, Friezing Machines,
Shafting, Pulleys, Hangers,
Couplings, Wood Turning and
Pattern Makers' Lathes.

WOOD WORKING MACHINERY.

CLEVELAND

GALVANIZING WORKS.

H. H. HODELL & CO.,

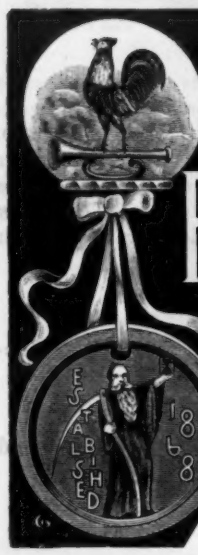
Galvanizing in all its branches, and Manufacturers of Rubber Buckets for chain pumps.

CLEVELAND, OHIO.

PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.
284 Pearl St., cor. Beekman. NEW YORK.

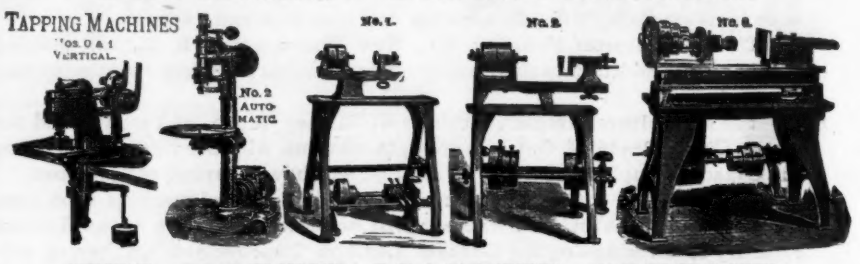
Plate Iron Washers
ASPECIALTY!
Even in Guage, smooth and well finished.
Cut from new plate, rolled expressly for the purpose. Write for prices, Address,
MILTON MFG. CO., Milton, Pa.

SAMPLES & PRICES ON APPLICATION
ALUMINOUS METAL ROOFING, EAVE TROUGHS, CONDUCTOR PIPES, VALLEYS, SHINGLES &
NON-CORROSIVE SUPERIOR TO COPPER AT PRICE OF TIN.
REQUIRES No PAINT FOR PROTECTION — SOLE MFGRS.
STAN-ALUMIN METAL CO. CANTON-O



THE ROBERT AITCHISON PERFORATED METAL CO.
CHICAGO, ILL.
PERFORATED METALS OF ALL KINDS
OFFICE 510---265 to 269 DEARBORN ST.
WORKS AT SOUTH CHICAGO.

OUR LINE OF TAPPING MACHINES.

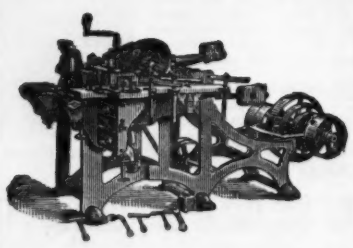


THE GARVIN MACHINE COMPANY,
Manufacturers of, and Dealers in, all kinds of
MACHINERY AND MACHINE TOOLS.
Universal and Plain Milling Machines, Drill Presses, Screw Machines, Hand and Engine Lathes, Planers, Profilers, Chucking Machines,
Gear Cutters, Die and Cutter Grinders, Tapping Machines, Wire-Spring Coilers, Milling Cutters, &c.
Plants for Manufacturers of Sewing Machines & Electrical Goods.
GEAR-CUTTING AND MILLING IN ALL ITS BRANCHES.
Laight & Canal Sts. [Catalogue sent on Application.] NEW YORK.

CATALOGUES Printed in the Highest Style of Art, by The Cleveland Printing & Publishing Co., Cleveland, O.

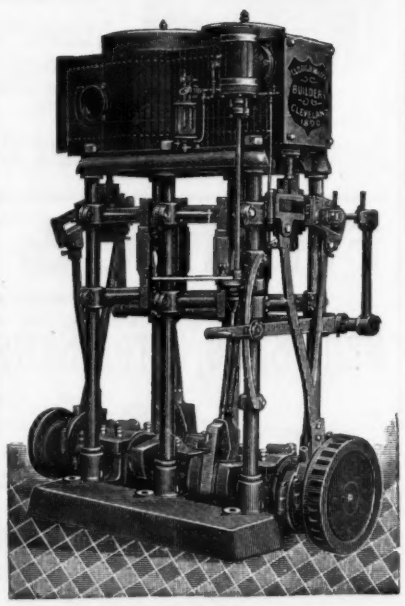
PORTBLE, HAND OR BELT PIPE CUTTING & THREADING MACHINE.
Double Application of Power. Double Leader Screw
Instantly Changeable, range from 1 to 6 in. Pipe.
Write for Description and Prices
WELLS MACHINE WORKS, FOSTORIA, O.

Do Not Buy

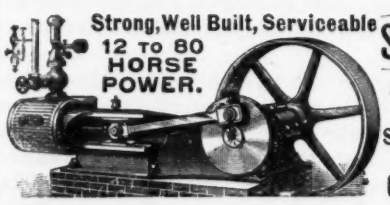


Wood Cutting Tools
Until you have received cuts and prices from
INDIANA MACHINE WORKS,
FORT WAYNE, IND.

COMPOUND AND MARINE ENGINES.

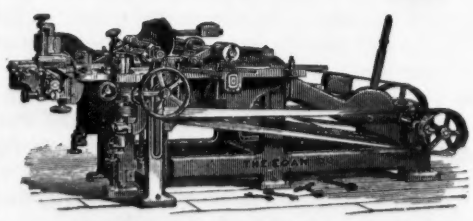


HIGH PRESSURE, STEEPLE AND FORE AND AFT COMPOUNDS.
—Send for Photo and Prices.—
CLOUGH, WITT & CO.,
CLEVELAND, OHIO.



Strong, Well Built, Serviceable 12 TO 80 HORSE POWER.
STEAM ENGINES
ADAPTED TO HEAVY, CONTINUOUS WORK.
EVERY ENGINE TESTED UNDER FULL LOAD.
Suitable BOILERS on hand for immediate delivery
FOR DESCRIPTIVE CIRCULARS ADDRESS
CHANDLER & TAYLOR CO., INDIANAPOLIS, IND.

THE ECAN CO.,
Nos. 251 to 271 W. Front St., CINCINNATI, OHIO.
Builders and Originators, Designers and Constructors.
Wood-Working Machinery.



New "Standard" Molder, Four Sided.
4, 6, 7, 8, 9, 10 and 12-inch.
Geared feed rolls, two above and two in table. Slotted steel heads.

For Every Purpose Meeting the requirements of PLANING MILLS. SASH, DOOR and BLIND FACTORIES, PATTERN SHOPS, General Wood-workers etc.
With the latest and most advanced type of machines for fast and perfect work.
Send for Catalogue and information.

The Wock Patent Slip Joint Eaves Trough, 10 ft. 2 in. Long, Without a Seam.

Steel and Wire Hangers, Etc.

THE BELDING PATENT LOCK SLIP JOINT TROUGH, Manufactured by THE CANTON STEEL ROOFING CO., Canton, O.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 75@16 50; Southern Coke No. 3 Foundry, $15 25@16 00; Southern Coke No 1, Softeners, $15 75@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $18 00@18 75; Ohio Silveries No. 2, $17 00@ 17 75; Ohio Strong Softeners No. 1, $18 25@19 50; Ohio Strong Softeners No. 2, $17 50@18 75; Lake Superior Charcoal Nos. 1 to 6, $18 00@19 00; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 50@18 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 00@13 50; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $20 00@20 50; Tennessee Car Wheel, $18 50@19 50; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 00@00 00; Mahoning and Shenango Valley strong, No 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $17 00@00 00; Ohio Softener No. 2, $ 6 00@00 00; Jackson Co., Silvery No. 1, $18 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 50@00 00; Southern Softener No. 1, $16 25@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00' Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@21 50; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. 7, $ 4 00@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $18 00@18 50; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $23 50@24 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $ 6 25@16 75; Southern Gray Forge, $14 75@15 25; Jackson County (Ohio) Silvery, $18 25@18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 50@15 00; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $17 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 25@16 50; No. 2 Foundry, $15 25@15 50; Grey Forge, $14 25@14 50; White and Motfled, $13 25@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $22 00@27 00; Bessemer, $17 00@17 50.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch	1 80
4½ to 6 by ⅜ to 1 inch	1 90
1½ to 6 by 1½ to 2 inch	2 20
1¼ & 1⅜ by ⅜ to ¾ inch	1 90
1 & 1¼ by ⅜ to ¾ inch	2 00
⅛, ¾ and ⅞ by ⅜ to ½ inch	2 20

Round and Square.

1 to 1⅞ inch	1 80
2 to 2⅝ inch	2 00
2¾ to 3¼ inch	2 10
3⅜ to 4 inch	2 80
4¼ to 4½ inch	3 30
4¾ to 5 inch	3 50

Oval.

⅜ to 1¼ inch	2 20
½ to ¾ inch	2 40
⅞	2 60
¾	3 00

Half Oval and Half Round.

1½ to 3 inch	2 90
⅞ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅝	3 30
½	4 80

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	2 00
¼ to 1¼ by ¼ and 5-16 inch	2 10
¼ to ⅞ by ¼ and 5-16 inch	2 30
to ⅞ by ¾ and 5-16 inch	3 80

Hoops.

1¾ to 4, Nos. 13 to 15	2 60
1¾ to 2, Nos. 16 to 18	2 70
1¾ to 2, No. 19	2 80
1¾ to 2, No. 20	2 90
1¾ to 2, No. 21	3 00
1¾ to 2, No. 22	3 10
15-16, 1 and 1⅛, Nos. 13 to 15	2 80
15-16, 1 and 1⅛, Nos. 16 to 18	2 90
15-16, 1 and 1⅛, Nos. 19 and 20	3 00
15-16, 1 and 1⅛, No. 21	3 10
15-16, 1 and 1⅛, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1⅛ to 6 by ⅛ to 3-16 in	2 20
1⅛ to 6 by Nos. 11 and 12	2 30
1 to 1⅜ by ⅛ to 3-16 in	2 40
1 to 1⅜ by Nos. 11 and 12	2 50
⅜ and 13-16 by ⅛ to 3-16 in	2 70
⅜ and 1 3-16 by Nos. 11 and 12	2 80
¼ and 11-16 by ⅛ to 3-16 in	3 00
¼ and 11-16 by Nos. 11 and 12	3 10
⅜ and 9-16 by ⅛ to 3-16 in.	3 30
⅜ and 9-16 by Nos. 11 and 12	3 40
⅛ by ⅜ to 3-16 in	3 60
⅛ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
¼ inch, " " " 11 and 12	3 10
¼ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅝ and 2¾ to 3 in	10½
3¼ to 4 in	11
⅜ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ½ thick	9

Bessemer and O. H. Steel.

Machinery, base price	2 75
Tire "	2 75
Spring "	3 25
Sleigh Shoe "	2 75
Toe Calk "	3 00
Cutter Shoes, tapered and burr. "	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	Net Tons
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	12 00
Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	8 00
Uncut wrought iron boilers	11 00
Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,

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BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

SHEET IRON AND SHEET STEEL

CAMBRIDGE REFINED IRON. TRADE MARK

Squared Roofing Sheets a Specialty.

CAPACITY RANGES FROM No. 30 26 INCHES WIDE TO 1-4×40×120

CAMBRIDGE SOFT STEEL. TRADE MARK

CORRESPONDENCE SOLICITED

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Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

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DALLIBA, CORRIGAN & CO.,

DEALERS IN

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Successors to Tuttle, Oglebay & Co.,

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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

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J. H. OUTHWAITE & CO.,

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AND METALS.

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MINERS AND SHIPPERS OF

Ohio Steam Coal and Coke.

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JAS. PATTERSON, Sales Agent.

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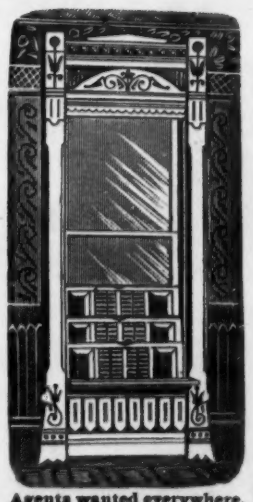
Hartman's Patent Inside Sliding Window Blind



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HARTMAN & DURSTINE, No. 59 Beaver St. Wooster, O.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@12
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shultz Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned.....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅛".....dis 50&10
Morse Taper and Straight shank Larger than 1⅛".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. PF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. P.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	⅜	5-16	½	⅝	¾	⅞	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11⅝	8½	6	5½	5⅛	5
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ⅛c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
Car lots.....$2.30
Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 13½
Sisal, ½ inch and over.....₩ lb 13½

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 10
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 6,
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls	21c@29c	
No. 18 " " ¼ and ½ "	18c@28c	
No. 36 " " ¼ and ½ "	16c@27c	
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)	11½c	
3-Ply " 1lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

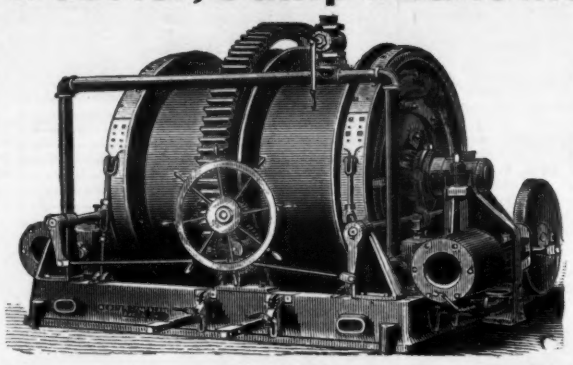
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 5

Wrenches.

Coe's genuine.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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Mining Machinery,

Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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ESTABLISHED 1828.

Oldest and Largest Manufacturers In the world.

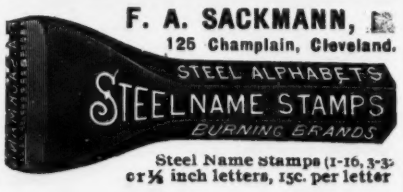
YULCANIZED RUBBER GOODS

For Mechanical purposes.

256-260 DEVONSHIRE STREET, BOSTON.

100 Chambers St., New York.
161 to 165 W. Pearl St., Cincinnati, Ohio.
148 to 150 Water St., Cleveland, Ohio
109 Madison St., Chicago, Ill.

THE THOS. D. WEST FOUNDRY, CO.
CLEVELAND, O.
LIGHT AND HEAVY
IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
DUPLICATE WORK A SPECIALTY.



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125 Champlain, Cleveland.

Steel Name Stamps (1-16, 3-32 or ¼ inch letters, 15c. per letter

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Detachable Roller and Chain Belting.

CHAIN.

MADE IN ALL SIZES OF

Malleable Iron and Steel,

DESIGNED FOR

Elevators, Conveyors, Drive Belts, etc.

For handling materials of all kinds.

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Eastlake Metallic Shingles.

Unequaled for ROOFING AND SIDING.

Manufactured by W. J. BURTON & CO.'s Galvanized Iron Cornice Works, Detroit, Mich.

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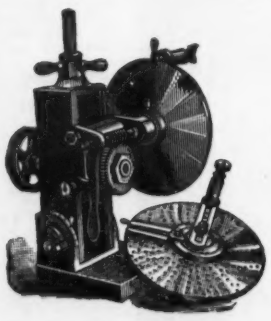

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CAN BE USED ON ANY SCREW-CUTTING LATHE FOR

Amateurs, Clock Makers, Model Makers, Knitting Machine Makers, Tool Makers,

Or any one having use for SMALL GEARING.

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CANTON IRON FOUNDRY CO.,
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HEAVY AND LIGHT CASTINGS.
Privilege to make estimates solicited.

THE BRIGHTMAN STOKER IS THE BEST
STEAM BOILER FURNACE IN THE WORLD.
SEND FOR DESCRIPTIVE PAMPHLET. THE BRIGHTMAN STOKER Co. 201-203 RIVER ST. CLEVELAND, OHIO.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Kberts Bros., Detroit.	
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light.	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ₩ ton	$30.00
Asphaltum, Fine Grade, ₩ lb.	.08
Coal Tar Felt, 1 Ply, ₩ lb.	.02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft.	1.42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft.	1.85
Roofing Pitch, ₩ gal.	.09

Chains.

Revised List.
Trace, 6¼-10-2.....₩ pair 1.03
Trace, 6¼-10-3.....₩ pair .92 } .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5½@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Urns, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in.	.....	2 25	.....
Baskets, waste paper, 13 in.	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11¼ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ₩ M.	23	24	25	26	28	dis 40
Putnam, ₩ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 6
Shutter bars, genuine bronze.....dis 6
Sash lifts, genuine bronze.....dis 6
Sash pulls and plates, genuine bronze.....dis 6
Push plates, genuine bronze.....dis 6
Drawer pull, genuine bronze.....dis 7
Letter box plates, genuine bronze.....dis 60&1
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.

Plumbs and Leve s.

Standard list.....dis 70&1
Pocket levels.....dis 70&1
Davis' inclinometers.....dis 10&1

Pumps.

Cistern, best makers.....dis 50&10@00
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ dos $6 00
Bishop's O K.....₩ dos $5 25
Bishop's Pioneer.....₩ dos $3 75
Bishop's American.....₩ dos $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@[illegible]...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ dos $21 00
Hatch, Tea, No. 161.....₩ dos $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ dos $18 dis 25

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Steel and iron, Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.
American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 40&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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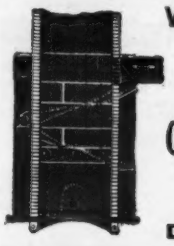

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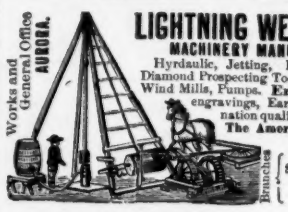

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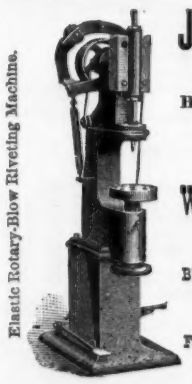

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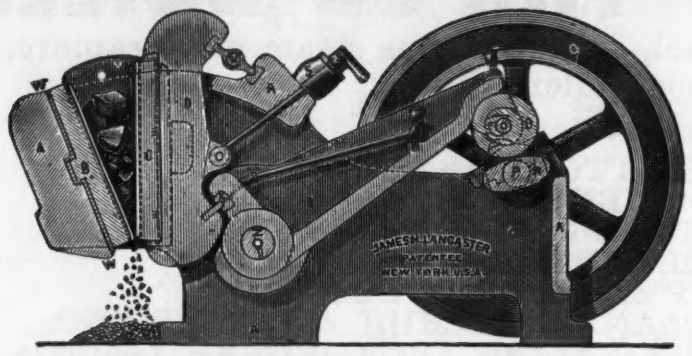

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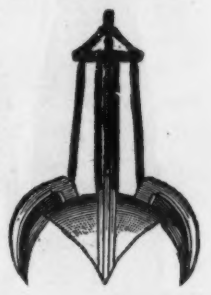

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N. Y. & Pitts. Express.....	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.
(Standard Gauge.)

Depart for—
Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—
Zanesville and Coshocton—10:30 a. m., 6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

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FOR AKRON, CANTON AND MARIETTA.
Depot oot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 25 a m	*6 40 p m
Marietta Express.....	‡11 15 a m	†2 35 p m
Balto. & Wash. Express....	*4 00 p m	*10 25 a m
Cleve. and Canton Express	†6 30 p m	†8 15 a m

*Daily. †Daily, except Sunday.

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From Cleveland Union Station.

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	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

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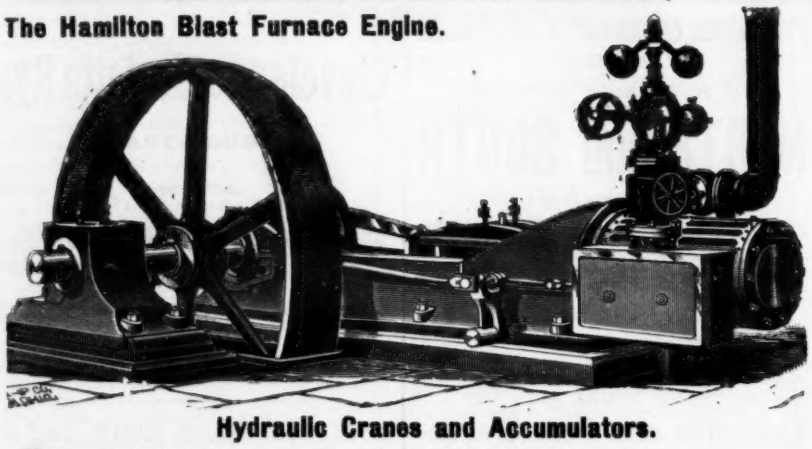

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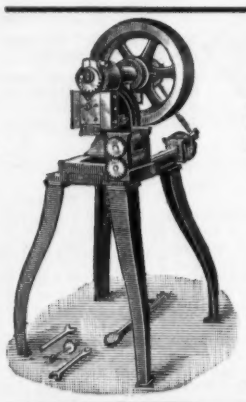

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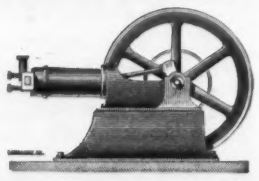

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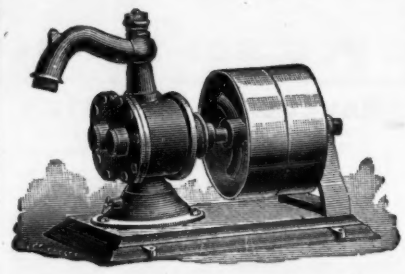

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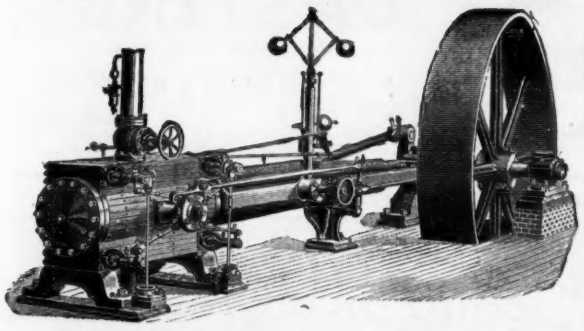

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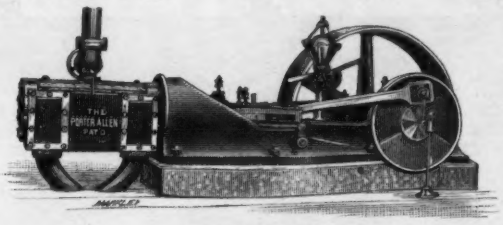

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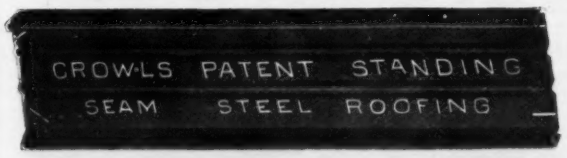

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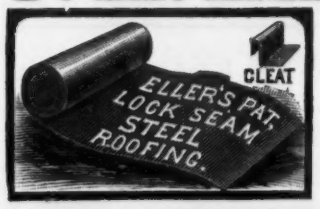

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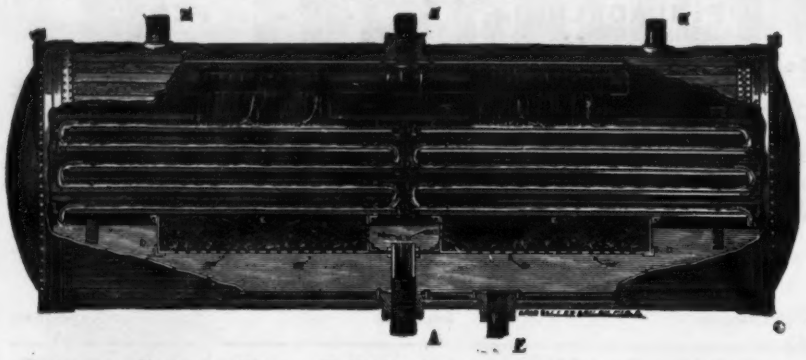

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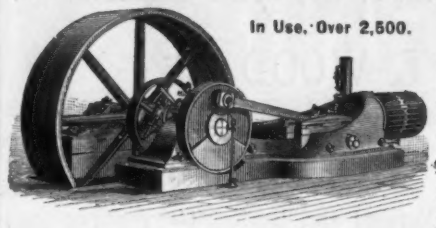

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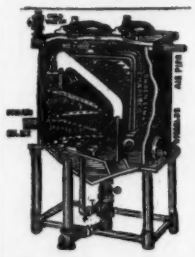

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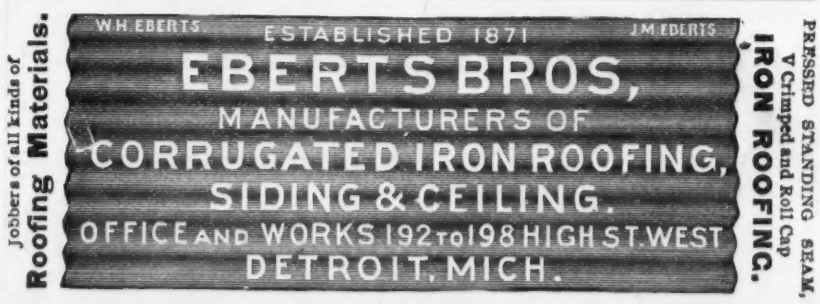
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